The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The I.C.I. Annual Meeting

THE first annual meeting of Imperial Chemical Industries, Ltd., noticed briefly in our last issue, was in its dimensions and composition one of the most impressive business assemblies ever brought together. The great body of shareholders, from those who looked down on the proceedings from gallery and boxes to those who sat contentedly on the floor for nearly two hours, were no less impressive in their unanimity of feeling. They were united on many points—on the satisfactory results of the first year's business and the good prospects for the future; on the remarkable efficiency already evident in the great organisation, of which Sir Josiah Stamp gave some striking examples in his reference to the accounts; on the importance of the technical achievements already attained and those immediately in view; on the extraordinary strength and competence of the management, as represented by the members of the board present; and finally on the perfect naturalness with which Sir Alfred Mond took his place as the creator and chief of this great undertaking. His speech from the chair, listened to at the time and re-read at leisure since, was as complete an exposition of the position and prospects as could have been compressed within such limits.

It was notable that the passages which brought the quickest response were not those speaking of dividends, but those that emphasised the human side of the undertaking and insisted on good relations with a contented body of workers as an indispensable condition of prosperity. "This," said Sir Alfred in words that will bear repeating, "is an asset in the balance sheets of companies that appears nowhere. No accountant values it. It does not appear in the securities, and no stockbroker tells you how much it is worth. The loyal co-operation of those who are working with you day by day right through your organisation is an asset of a magnitude that far outweighs the millions put down for bricks, mortar, and steel in the so-called assets of a great corporation." The feeling of the meeting, as they listened to these imaginative words, was that Imperial Chemical Industries, in this matter, might give to other large industries, and, indeed, to the country and the Empire at large, a fine example in the right use of labour, as well as in the right use of scientific and technical knowledge, the right treatment of the raw materials in which this country is still rich, and the right use of the best engineering practice in adapting plant to process. If someone had put this sentiment into words, it would instantly have been endorsed by the meeting.

Coming to the bare facts of the speech, the principal points may be shortly summarised. The I.C.I. has now a complete controlling interest in 40 manufacturing and trading concerns and a large measure of control over more than 30 others, and over these 70 organisations within twelve months complete executive control has been attained in finance, management, labour, and policy. Billingham, it became clear, is to be the great centre of chemical development. One of the by-products, we learned, is a form of precipitated chalk, suitable for the manufacture of cement, and a process has been worked out for making both cement and sulphuric acid. As to the future of synthetic fertilisers the Chairman had no doubt, and the company's programme is to be further extended; equally emphatic was the Chairman's claim that in the production of synthetic nitrogen products the company have nothing to fear from any competition. It is, in addition, expected shortly to start a plant for the production of methanol. Already petrol has been produced from Durham coal on a small scale, and so promising are the results that the company intend to proceed both at home and in the Dominions with this new and important industry. Much was said about relations with the I.G. and other foreign organisations, but nothing could have been plainer than Sir Alfred Mond's declaration—"We are the guardians

of the development of the chemical industry of this country and the Empire, and no considerations, monetary or other, will ever lead us to adopt a policy that inflicts any damage on this great trust imposed on us."

Exhaustive as the Chairman's review of the situation seemed to be, Sir Harry McGowan supplemented it by a statement of great interest which further illustrated the masterful grasp of problems already attained. Among the many points he touched on may be mentioned the satisfactory sales of the past year, the policy of conferring with large customers to obtain prior knowledge of their prospective requirements, the exploration of trade possibilities within the Empire and in the United States and South America, the policy of installing in the Colonies local plants for the conversion of coal into oil and for the production of synthetic fertilisers, and the good relations that exist with American concerns like the Du Pont Co., the Allied Chemical Co., and others.

Generally speaking, the meeting must have impressed the shareholders with the efficiency with which the vast organisation is being handled, the quickness with which it has got into its stride, and the confidence with which it contemplates future developments.

The Nitrogen Conference

THE papers read at the International Nitrogen Conference held on board the s.s. *Lutzow* in May have just been published, in a manner in keeping with the efficient organisation of the Conference. The papers are published in English, French and German, which should secure for them the widest perusal. The total list is as follows: "Some Nitrogen Problems," by F. C. O. Speyer (Nitram, Ltd., London); "Fertiliser Problems and Prospects in India," by T. H. J. Carroll (Nitram, Ltd., London); "The Chemistry of Intensively Treated Grassland," by H. J. Page (Nitram, Ltd., London); "Research and Education in Relation to Practical Farming," by Sir Frederick Keeble, F.R.S. (Nitram, Ltd., London); "Nitrogen Economics—Retrospect and Prospect," by Dr. J. Bueb (Nitrogen Syndicate, Berlin); "Intensification of Arable Crop Production in Relation to Plant Breeding," by Professor Erwin Baur (Institute for Genetic Research, Berlin); "Natural and Economic Principles Governing the Use of Artificial Fertilisers," by Professor H. Warmbold (Berlin); "Cultivation of the Soil in Relation to Nitrogenous Fertilisers," by Professor L. Brétignière (National Agricultural Experimental Station, France); "Irrigation and the Use of Lime in Relation to Nitrogenous Fertilisers," by J. Galland (France); and "Observations on the Association of Ammonia and Nitrate Nitrogen in the Manuring of Crops," by Dr. A. Demolon (Ministry of Agriculture, France).

It will be seen that these publications may be regarded as summarising the present state of knowledge of many aspects of food production and the use of fertilisers, and as such they are of considerable value. It might even be suggested that the organisers would have added to our obligations by the publication of a volume giving the papers together with the discussions and such other information as is available for publication. Apart from the papers, great interest attaches to the very comprehensive resolution passed by the Conference, details of which were given in this journal on May 26. If the synthetic fertiliser industry bends its energy internationally to the realisation of the aims outlined in that resolution, there should be some remarkable developments in agriculture in the near future.

The Birthday Honours

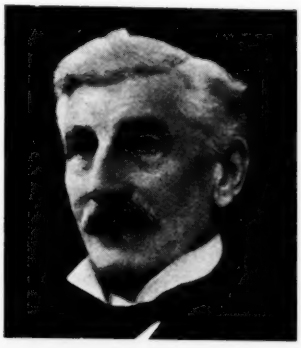
THE King's birthday honours announced this week include several names well-known and honoured in connection with chemical science and industry. The most important is the elevation of Sir Alfred Mond to the peerage with the rank of Baron. This will create no surprise; in fact, it has been the subject of confident rumour for some time. Nor will any one need to inquire into the grounds for such an honour. Sir Alfred Mond has rapidly developed in recent years into a national and even an international figure in British industry and science, and as head of Imperial Chemical Industries he wields an influence in industry probably unequalled to-day by that of any other single citizen. Dr. C. H. Lander, who has given several years of good work to fuel research, first as assistant to the late Sir George Beilby and since as his successor as Director of Fuel Research, will be congratulated on being made a Companion of the British Empire. A Companionship of the Indian Empire, conferred on Dr. J. A. Voelcker, is a recognition of a quite exceptional position attained in the field of agricultural chemistry. Dr. Voelcker, who attains his 74th birthday this month, has honourably maintained the high tradition set by his father in this field of study and practice. An Imperial Service Order for Mr. David A. Gracey, superintending chemist at the Government Laboratory, is an acknowledgment of efficient scientific service of the kind that often escapes public attention. While these are the names most directly associated with chemical enterprise, there are other welcome examples in the Honours List of recognition for scientific research and administration.

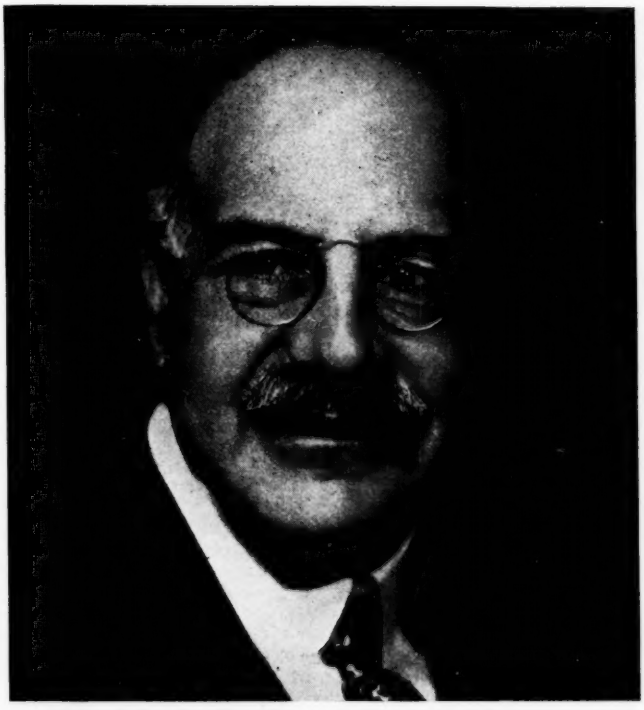
Books Received

THE THOMAS RECORDING GAS CALORIMETER. Fuel Research Technical Paper No. 20, Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 42. 9d.

The Calendar

June 9	Institute of Chemistry and Society of Chemical Industry (Edinburgh Sections): Visit to the Experimental Farm, Boghall. 2.45 p.m.	Edinburgh.
11, 18	Armourers and Brasiers' Company: "The Founding of Aluminium and Its Light Alloys." George Mortimer.	Royal School of Mines, South Kensington, London.
12, 19	Armourers and Brasiers' Company: "The Heat Treatment of Steel." Dr. J. M. Robertson.	Battersea Polytechnic, London.
26	National Physical Laboratory: Annual Visit of Inspection. 3 to 6 p.m.	Teddington.
Sep. 3–7	Society of Chemical Industry: Annual General Meeting.	New York, U.S.A.





Birthday Honours for Well-known British Scientists

THE KING'S BIRTHDAY HONOURS LIST, PUBLISHED THIS WEEK, INCLUDES A NUMBER OF SCIENTISTS ASSOCIATED WITH THE CHEMICAL INDUSTRY. THE PORTRAITS ABOVE (LEFT TO RIGHT) ARE THOSE OF MR. D. A. GRACEY, SUPERINTENDING CHEMIST AT THE GOVERNMENT LABORATORY (I.S.O.); DR. J. A. VOELCKER OFFICIAL AGRICULTURAL ANALYST (C.I.E.); AND DR. C. H. LANDER, DIRECTOR OF FUEL RESEARCH (C.B.E.). THE CENTRE PORTRAIT IS THAT OF SIR ALRED MOND, WHO BECOMES A PEER WITH THE RANK OF BARON.

The Industrial Production of Citric Acid

By G Malcolm Dyson, Ph.D., A.I.C.

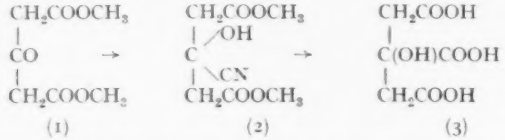
In the following article, Dr. Dyson discusses the production of citric acid not only from direct natural sources, but also by means of synthesis, fermentation methods, etc.

AMONG the organic acids which are industrially valuable, citric acid has held a consistently high position for many years. The bulk of citric acid is used as such, without any further chemical manipulation, for the production of the so-called lemonade powders, effervescent medicinal preparations, and in the calico printing industry. The first authentic mention of citric acid in the historical chemical records is found in the *Speculum Naturale* of the thirteenth-century alchemist Vincentius Bellovacensis, who in discoursing of acid solvents mentions "aqua limonum, vel pomorum citrinorum." Scheele was, however, the first to obtain the acid in the form of crystals and to characterise it by the formation of many of its salts. Commercially, the production of citric acid has been a comparatively steady business for many years, except, of course, during the war periods. Thus, in the years 1908–1910, the Italian production of this acid was 6,000 metric tons per annum, whilst in 1918–1920 it had risen to 8,500 metric tons per annum; at the present time it has dropped slightly to 8,000 metric tons owing to the loss of part of the American market.

Occurrence

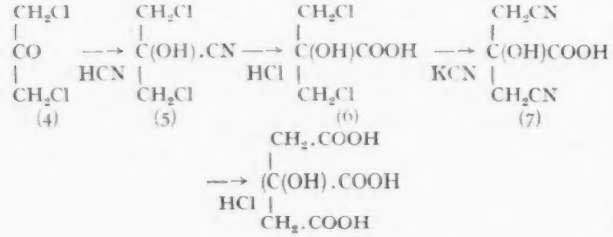
Free citric acid occurs in many plant tissues. In the fruits of the citrous species it occurs free, and with but little malic acid, as it also does in sloes, cranberries, whortleberries, etc. In fruits such as the cherry, strawberry, raspberry, etc., it occurs with an approximately equal proportion of malic acid, and with tartaric acid in the tamarind and the berries of the mountain ash. Various other plants such as the onion, lettuce, indigo plant, etc., contain citric acid in the form of the calcium salt.

The possible methods by which citric acid can be obtained may be conveniently divided into three groups, (a) synthesis from less complicated organic substances, (b) the fermentation of sugars, etc., by suitable micro-organisms, and (c) extraction from the various fruits in which it occurs. Industrially, the third group is the only one of importance, but the others are sufficiently of interest to warrant a short description. The synthesis of citric acid offers many difficulties, not the least of which is the absence of a suitable starting material. It is sufficiently simple, of course, to start from acetone dicarboxylic ester (1), and proceed by the hydrolysis of its hydrocyanic acid addition compound (2) to citric acid (3); but the difficulty of obtaining such a raw material in quantity is sufficiently obvious.



(1) (2) (3)

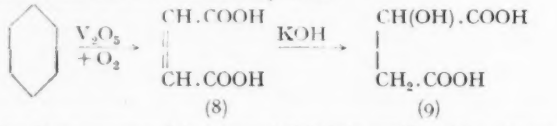
A more suitable starting material is symmetrical dichloracetone (4), which can be obtained readily by the chlorination of acetone under suitable conditions, and which also yields a hydrocyanic acid addition product (5), easily hydrolysed to dichlorohydroxyisobutyric acid (6). This may be converted by treatment with potassium cyanide into the dinitrile of citric acid (7), from which citric acid itself may be produced by further hydrolysis.



(4) (5) (6) (7)

Synthesis of Malic Acid

It will be readily seen that the citric acid industry has very little to fear from synthetic methods of this type; the synthesis, however, of malic acid on a large scale is a more important matter. It has been claimed that good yields of maleic acid (8) can be obtained by the oxidation of benzene with aerial oxygen, in the presence of a specially prepared vanadium pentoxide catalyst, and large scale trials have shown that this is substantially true.



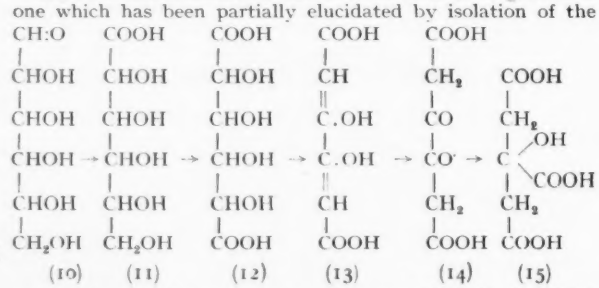
(8) (9)

It has been proposed to convert this into malic acid, a transformation readily effected by heating with dilute alkali (9), and to use the malic acid in place of citric acid. Malic acid is a natural fruit acid which has, in the opinion of many, a slightly more pleasant taste than citric acid. For the preparation of beverages, cordials, etc., malic acid is equal in all respects to citric acid, but it has the disadvantage of deliquescence which renders its use inadvisable in pharmaceutical preparations, effervescent salines, etc. The technical difficulties of the production of malic acid in this manner have not yet been fully overcome, but it is a process which offers commercial possibilities.

Citric Acid by Fermentation Methods

The production of citric acid by fermentation has engaged the attention of many research workers, but it is not yet possible to make this acid on a commercial scale by fermentation processes. The fact that citric acid could be produced by the fermentation of sugars (notably sucrose and glucose) was first pointed out by Wehmer, in 1891, and it has since been shown that various moulds and yeasts such as *Aspergillus niger*, *Citromyces pfefferianus* and *Citromyces glaber* are able to convert a considerable amount of sugar into citric acid. In this respect the *Citromyces* are the most satisfactory, since they have a slighter tendency towards the destruction of the citric acid with the formation of oxalic acid than the other organisms. *Citromyces* works best in a 5 per cent. solution of sugar, of which it converts from 25–50 per cent. into citric acid, but the technical difficulties of production are very considerable. In the first place it is essential that the culture be kept pure, since contaminating organisms readily destroy the raw material and the product; in the second place the production is a slow one and some weeks are taken for the maximum amount of citric acid to be formed, while the extraction of the citric acid, when formed, is not easy.

The mechanism of the formation of the acid from glucose is one which has been partially elucidated by isolation of the



(10) (11) (12) (13) (14) (15)

various intermediate products. The weak link in the chain was that of the production of saccharic acid, but Walker, Subramaniam and Challenger have recently isolated potassium hydrogen saccharate as a fermentation product of glucose by *Aspergillus niger*, and have also isolated citric acid from the fermentation products of saccharic acid. The first step in the formation of citric acid is probably the formation of

gluconic acid (11), which is then converted into saccharic acid (12). This latter substance is converted through a hypothetical intermediate compound (13) into βγ-diketoadipic acid, which was shown by Franzen and Schmitt to undergo the extrusion reaction (as with benzil and benzilic acid) with the formation of citric acid (14, 15).

Commercial Preparation

There are two sources from which commercial citric acid is obtained, the familiar lemon and lime, and the pineapple waste from the canning industry. In the U.S.A. a considerable tonnage of citric acid is produced from the latter source, since immense quantities of pineapple shavings are obtained during the packing of the fruits. As a general rule only the small and imperfect lemons or limes are used for the production of acid, and the yield varies from 15 to 50 lb. per ton of fruit, according to its quality. The crop, as it is unloaded at the factory, is sorted by passage along inspection bands, and the small and damaged fruit is passed to a peeling machine in which the peel is removed for the extraction of the oil. The removal of the peel gives a whiter acid owing to the decreased contamination with tannin-like substances. The peeled fruit is passed to a cutter and crusher where a fair amount of the juice is extracted. Further juice is obtained by pressing the pulp from the crusher, and the marc or residue is soaked with wash water from a previous operation and subjected to a further pressing in which the greater part of the residual acid is extracted.

The juice so obtained contains about 4 per cent. of citric acid, but contains, in addition, about 0.5 per cent. of pectous matter, which renders it thick and almost impossible to filter. Clarification is effected by fermentation. The juice is allowed to stand in large vats for four to five days in warm weather—ten days in cooler weather—during which time the sugar and pectous material are removed by bacterial action. No bacterial control is exercised, and infection with the fermenting organisms is ensured by always retaining a small quantity of liquor in the fermentation vats. Practically no citric acid is lost in this operation. The juice may now be filtered quite readily, and is raised to the boil in wooden vats, and kieselguhr added to the extent of 1 per cent. by weight of the liquor to be treated. Heating is performed by the use of copper steam coils, and is continued until a test sample settles out readily, leaving a crystal-clear amber-coloured solution. The juice is then filtered into the neutralising tanks, where a sample is assayed for its citric acid content. The course of these operations is shown in the accompanying flow-sheet.

Treatment of the Juice

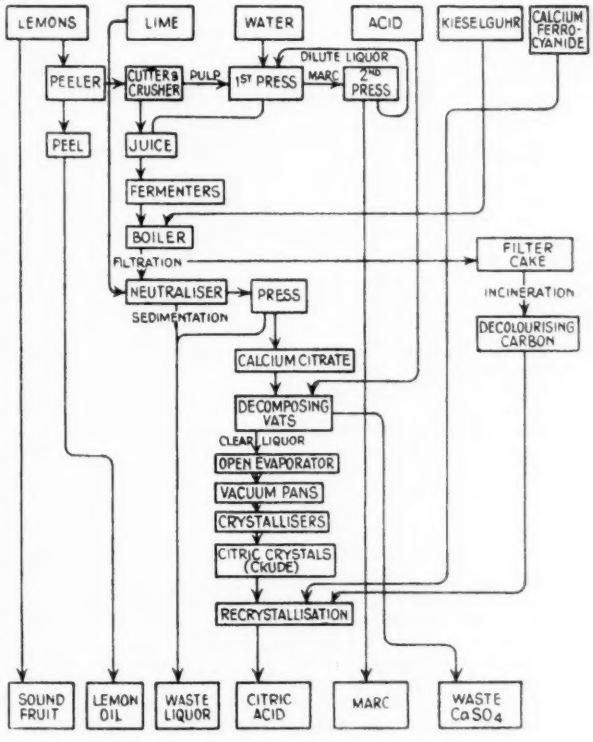
The boiling juice is neutralised by the addition of milk of lime, in quantity equal to 90 per cent. of that calculated from the assay for complete neutralisation. If neutralisation is allowed to proceed further discoloration of the product is caused. The boiling liquor is filtered through Monel metal presses as rapidly as possible and the residue washed.

The liberation of the citric acid from the calcium salt obtained as a press cake in the last operation is effected by means of sulphuric acid (s.g. 1.84). Sufficient acid is added slowly to the calcium citrate suspended in wash water from a previous operation, to set free the citric acid completely. As this quantity cannot be calculated, owing to the variable amount of moisture in the calcium citrate press cake, it has to be ascertained by trial and error methods. A sample is filtered off from time to time, and 5 c.c. of the clear filtrate added to an equal quantity of 50 per cent. calcium chloride solution. The test mixture is heated on the steam-bath for ten minutes; the first signs of a precipitate indicate the presence of 0.2 per cent. of free sulphuric acid, and sufficient calcium citrate is added exactly to neutralise this excess. The calcium sulphate is allowed to settle out under the influence of gravity, and the clear liquor siphoned off into lead-lined open pans in which it is concentrated until the s.g. has risen to 1.18.

During this operation the heat is applied by steam coils, and agitation is effected by numerous air jets. The process is more one of "simmering" than of true boiling; hard boiling tends to discolour the product. The remainder of the evaporation is carried out in lead-lined vacuum pans, and when the s.g. has risen to 1.35 the liquid is delivered to the crystallisers. After three to five days a good crop of large crystals is obtained, which is separated from the mother liquor by centrifuging in bronze baskets with Monel metal linings. Gentle agitation during the crystallisation gives smaller and purer crystals. The mother liquor is, of course, evaporated with the next batch of dilute liquor.

Citric acid crystals prepared in this way are of a pale honey colour, and contain considerable amounts of various impurities. The inorganic impurities comprise calcium sulphate, which remains as an insoluble fraction in subsequent recrystallisation; a little free sulphuric acid, together with traces of lead and antimony derived from the linings of the evaporators, and traces of copper and nickel from the centrifuge baskets; while traces of iron are also present.

The copper, lead, and antimony are precipitated by the passage of a small quantity of hydrogen sulphide, while the nickel and iron are removed by the addition of calcium ferrocyanide. The exact amount of ferrocyanide required is assayed in the following way. A series of samples of the citric acid solution is taken, and to each is added a varying amount of 1 per cent. calcium ferrocyanide solution together



PRODUCTION OF CITRIC ACID FROM LEMONS.

with a little decolorising carbon and kieselguhr. They are filtered, and to each filtrate is added a little ferrocyanide solution. That solution which contains the greatest amount of calcium ferrocyanide, but whose filtrate still gives a blue colour with more ferrocyanide, is the correct one. In addition to inorganic impurities there is a small amount of organic colouring matter present, which is removed by decolorising carbon. The crude citric acid is dissolved in boiling water, the necessary reagents are added together with the decolorising carbon and kieselguhr, and the whole is boiled together for a few minutes and filtered. The crystals which separate on cooling form the citric acid of commerce.

Discoloration of the Product

The question of the darkening of the juice with subsequent discoloration of the product is of very considerable importance in the production of the acid, especially where it is obtained by the direct crushing of limes which have not been previously peeled. Lime juice when expressed is of a pale green colour, but on standing with free access to the air it turns brown and ultimately becomes black. This has been shown to be due to the oxidation of polyhydric phenols, which give a substance analogous to phlobaphene.

These objectionable compounds have been localised by Hardy and his co-workers, and it appears that they are to be found in the outer yellow rind. From this part of the fruit these investigators isolated a green vitreous mass which is probably a catechol tannin, since it gives an emerald green colour with ferric chloride, and is rapidly oxidised in alkaline solution with the formation of black products. It is owing to the presence of this compound that the neutralisation of the defecated juice is not carried to completion. If the p_H exceeds 7.3 this discoloration is bound to set in, and for this reason a modified neutralisation process has been devised by which the discoloration is avoided. The fermented juice is treated with sufficient soda ash to neutralise one only of the acid groupings of the citric acid present. The liquor is still quite acid (p_H 3.8), but the change in p_H is sufficient to allow of filtration taking place easily. Accordingly, the partially neutralised juice is filtered with decolorising carbon and kieselguhr, and calcium chloride solution, slightly in excess of that equivalent to the soda ash used, is added. The rest of the extraction may then be proceeded with as before. This modification of the process described above enables colourless crystals to be readily obtained from unpeeled limes.

The Honours List

A Peerage for Sir Alfred Mond

THE King's Birthday Honours List contains the following names of chemical and scientific interest :—

Baron : Sir Alfred Mond, M.P., chairman of Imperial Chemical Industries, Ltd., for public and political services. Sir Alfred Mond is the son of the late Dr. Ludwig Mond, who settled in this country and was naturalised a year or more before the birth, in 1863, of his son. Sir Alfred passed from Cheltenham College to Cambridge, and thence to Edinburgh. He was called to the Bar at the Inner Temple in 1894, and practised for a time on the North Wales and Cheshire circuit. His scientific and commercial abilities, however, soon led him to take an active part in the industries which his father had established and developed. He first entered Parliament in 1906 as member for Chester, and four years later transferred to Swansea, for which he sat for thirteen years. In August, 1924, he was elected for Carmarthen. He was First Commissioner of Works from 1916 to 1921, and Minister of Health from 1921 to 1923.

Knight : Dr. J. H. Jeans, F.R.S., secretary of the Royal Society, and member of the advisory council of the Department of Scientific and Industrial Research. Dr. Jeans is an eminent mathematician and astronomer, who has published important work on the kinetic theory of gases, the quantum theory, and many stellar problems.

Companion of Honour : Professor J. S. Haldane, F.R.S., director of the Mining Research Laboratory of Birmingham University, and president of the Institution of Mining Engineers. For scientific work in connection with industrial disease.

Companion of the Order of the Indian Empire : Dr. John Augustus Voelcker, F.I.C., consulting chemist, official agricultural analyst, and public analyst. Dr. Voelcker has held the offices of vice-president of the Institute of Chemistry (of which he has also been a censor and a member of council), president of the Society of Public Analysts, and of the Farmers' Club, and member of the council of the Chemical Society. He has made a special study of chemistry in relation to agriculture, has been consulting chemist to the Royal Agricultural Society since 1885, and is president of the Agricultural Analysts' Association and a member of the Lawes Agricultural Trust Committee. In 1889-90 he visited India, at the invitation of the Government of India, to report on the scientific improvement of agriculture. Dr. Voelcker will reach his seventy-fourth birthday this month.

Companion of the Order of the British Empire : Dr. C. H. Lander, Director of Fuel Research to the Department of Scientific and Industrial Research ; and Mr. H. E. Wimperis, Director of Scientific Research to the Air Ministry.

Order of the British Empire : Mr. P. J. Wheeldon, Establishment Officer of the Department of Scientific and Industrial Research.

Companion of the Imperial Service Order : Mr. D. A. Gracey, F.I.C., a Superintending Chemist at the Government Laboratory, Clement's Inn Passage, London.

Death of Dr. F. M. Perkin

THE death took place on Thursday, May 24, of Dr. Frederick Mollwo Perkin, C.B.E., Ph.D., F.I.C., consulting chemist, at the age of 58. The youngest son of the late Sir William Perkin, F.R.S., and the brother of Professors W. H. Perkin, F.R.S. (of Oxford) and A. G. Perkin, F.R.S. (of Leeds), he was educated at the Royal College of Science, Edinburgh University, Owens College, and the University of Wurzburg (where he became Doctor of Philosophy). He interested himself especially in the study of electrochemistry and the low-temperature carbonisation of coal (particularly the production of smokeless fuel), as well as in peat and its utilisation. He was head of the Chemistry Department at the Borough Polytechnic Institute, London, 1897–1909 ; one of the founders of the Faraday Society, and its treasurer,

Elliott & Fry

THE LATE DR. F. M. PERKIN.

1903–17 ; president of the Paint and Varnish Society ; president of the Oil and Colour Chemists' Association, 1918–20 ; an Honorary Member of the Institute of Gas Engineers ; technical adviser to the Committee on Production of Oil from Cannel Coal and Allied Materials ; and honorary secretary of the British Science Guild, 1908–16. His publications included a number of papers read before the Chemical Society, the Society of Chemical Industry, and the Faraday Society ; the Cantor Lectures on Oils, 1915 ; and books on *Qualitative Chemical Analysis, Practical Methods of Electrochemistry, Practical Methods of Inorganic Chemistry, The Metric System*, and a *Textbook of Elementary Chemistry*. He was made a C.B.E. in 1920 in recognition of his services to the Government. The funeral took place at Roxeth Cemetery on Tuesday, May 29, there being present, among others, Mrs. F. M. Perkin (widow), Mr. W. F. Perkin (son), Misses Isobel and Alix Perkin (daughters), and Professors W. H. and A. G. Perkin.

Award of Willard Gibbs Medal to Professor Harkins

PROFESSOR WILLIAM D. HARKINS, of the University of Chicago, recently received the Willard Gibbs Gold Medal, awarded annually by the Chicago Section of the American Chemical Society to a chemist whose work in either pure or applied chemistry has received world-wide recognition. On the occasion of the award, Professor Harkins delivered an address on "Surface Structure and Atom Building." His scientific papers include more than 80 contributions to various branches of chemistry and physics. Some of the subjects treated are atomic structure ; the theory of the evolution of the elements ; energy relations involved in the formation of the elements ; the separation of the elements into isotopes ; the nature of the surface of liquids ; measurement of the energy of formation of the surface, etc. He is 52 years of age.

A German View of I.C.I.

Favourable and Other Criticism

AN article on the development and position of Imperial Chemical Industries, Ltd., written by Dr. Alfred Marcus, of Berlin, has just appeared in the *Chemiker-Zeitung* (May 30). Owing to lack of space, it is impossible to give a verbatim translation, but a note on the points made will probably be of interest to British readers.

Dr. Marcus is of the opinion that the formation of I.C.I. was due to the fact that German competition in chemicals and allied substances was very severe. Especially does he mention, in this regard, the British Dyestuffs Corporation, whose early difficulties are reviewed at considerable length, while attention is drawn to various criticisms which were from time to time made against the B.D.C. in this country. The German writer next reviews the positions of Nobel Industries, Brunner, Mond and Co., and the United Alkali Co. respectively before the fusion. He states that Sir Alfred Mond is now regarded as the leader not only of I.C.I., but of the whole British chemical industry, and that he carries alone the responsibility for its future development. His past history, and great international reputation, are regarded as offering an assurance of his capacity for the task.

Apart from the activities formerly pursued by the separate members of the combine, it is suggested that I.C.I. is taking an interest in metallurgical matters. Attention is drawn to the numerous rumours which have connected I.C.I. with the Dead Sea concession. A special point is made of the increased interest which is being taken in synthetic fertilisers, and of the fertiliser programme drawn up at the Imperial Agricultural Research Conference. Great opportunities exist for I.C.I. in the enormous areas of the British Empire. Important economic results should follow the general scientific application of fertilisers to countries in the Empire growing wheat and other cereals, as well as cotton, rice, rubber, tobacco, tea and other things. Dr. Marcus is clearly much impressed by these possibilities, and remarks that in regard to this part of the programme of development of I.C.I. the prognosis is favourable.

Vitriol Works Destroyed

Fire at United Alkali Co.'s Works

THE Golding Davies Vitriol Works of the United Alkali Co., situated on West Bank Dock, Widnes, were completely destroyed by fire on Tuesday. The works were used for the manufacture of vitriol, in which spent oxide from gas works was used. As storage tanks became involved, great quantities of vitriol flooded the works to a depth of 2 feet, later finding a passage to the dock, and finally an outlet to the Mersey, near the transporter bridge. Firemen had difficulty in getting to the seat of the outbreak. By noon, however, the fire had been checked, but access to various parts of the works was made impossible by accumulations of acid, of which about 700 tons was released by the bursting of chambers and storage tanks. Six large vitriol chambers, fourteen storage tanks, and spent oxide burners were destroyed, the damage being estimated at about £60,000. The portion of the dock from which the fire brigades obtained a supply of water was locked off from the main dock, and as time passed it showed signs of becoming dry, and vitriolised water from the works was running back. Sluices were opened, therefore, in the shipping part of the docks to replenish the supply in the upper part. The damage is covered by the company's own insurance scheme.

"C.A." Queries

We receive so many inquiries from readers as to technical, industrial, and other points, that we have decided to make a selection for publication. In cases where the answers are of general interest, they will be published; in others, the answers will simply be passed on to the inquirers. Readers are invited to supply information on the subjects of the queries :—

102. (*Spongy Platinum*).—A firm in Bath is anxious to get in touch with suppliers of spongy platinum mounted on platinum wire as used in some of the gas-lighters which had a considerable sale some few years ago. They are carrying out some experiments and desire to obtain the most reliable material it is possible to use for the purpose.

Chemical Matters in Parliament

Safeguarding Act: Lactic Acid and Cocaine

Mr. Fenby asked the President of the Board of Trade (House of Commons, June 5) whether he was aware that the exemption orders applied for during the past two years under Section 10 (5) of the Finance Act, 1926, in respect of lactic acid of a quality known as pale technical, 50 per cent. by weight, and lactic acid, edible quality, being products liable to duty under Part I of the Safeguarding of Industries Act, 1921, had not yet been issued; that the only lactic acid produced in His Majesty's Dominions was a crude dark cloudy quality; that this quality could not be satisfactorily used in the textiles industry, the artificial silk industry, by manufacturers of light coloured and fancy leathers, and in other important industries; that manufacturers of foodstuffs and soft drinks were bound to use the edible quality; that all these industries had, during the past two years, been compelled to pay more than would otherwise have been the case for these raw materials, which had to be imported; and would he take steps to issue the exemption orders in question forthwith?

Sir P. Cunliffe-Lister, in reply, stated that lactic acid which satisfied the requirements of most consumers in this country had been made here for some years past, and he understood that other kinds were now being produced in this country, and would be produced in substantial and increasing quantities. He was, accordingly, not satisfied that the conditions for exemption from duty were fulfilled except in the case of lactic acid complying with the requirements of the British pharmacopœia, which had already been exempted.

In reply to Mr. Fenby (House of Commons, June 5) Sir P. Cunliffe-Lister stated that the manufacture of cocaine and cocaine hydrochloride in substantial quantities had been carried on in this country for some time past under the authority of the Home Office. He understood that the materials would shortly be available for disposal, and the conditions for exemption from duty were, therefore, not satisfied.

Calcium Biphosphate Inquiry

AMONG the witnesses at the recent inquiry respecting the inclusion of calcium biphosphate of baking powder quality in the list of dutiable articles under Part I. of the Safeguarding of Industries Act was Mr. A. F. Butler (a director of R. W. Greeff and Co., Ltd., chemical merchants), whose evidence was inadvertently omitted from our last issue. Giving evidence in support of the opponents, Mr. Butler said he had bought acid calcium phosphate (calcium biphosphate) as containing a maximum of 10 per cent. of calcium sulphate, and conforming to the requirements of the Food and Drugs Act. His firm had always stipulated that the maximum calcium sulphate content should be 10 per cent., but, of course, the calcium sulphate might be lower.

Mr. Swan asked if "acid calcium phosphate of baking powder quality" was a current trade description.

Mr. Butler said it was. In his trade experience he did not remember having heard calcium biphosphate of baking powder quality described as a fine chemical.

Cross-examined by Mr. Cripps, he agreed that more than half of his firm's business in this material had been in the imported material. He did not agree that his last transaction in the buying and selling of this material had occurred ten years ago, but it was more than two years ago. He said he had handled it in ton lots.

Appointments Vacant

UNIVERSITY READERSHIP in Chemistry tenable at East London College, University of London.—The Academic Registrar, University of London, South Kensington, London, S.W.7. June 21.

DEMONSTRATOR in Chemistry at St. Bartholomew's Medical College.—The Dean, St. Bartholomew's Hospital Medical College, London, E.C.1. June 20.

ASSISTANT GENERAL MANAGER for the Chemical and Metallurgical Corporation, Ltd.—The Managing Director, The Chemical and Metallurgical Corporation, Astmoor Works, Runcorn. Further details of this post will be found in our advertisement columns, page xxxii.

From Week to Week

CAPTAIN G. S. HOPLEY has been elected an additional director of the British Molasses Co.

MR. H. T. SCHIERWATER and Mr. H. T. Coles have been elected additional directors of the Pure Cane Molasses Co.

RECENT WILLS INCLUDE: Mr. Frederick Cumbers, of Hampstead, a departmental manager of British Celanese, Ltd., £16,340 (net personalty £12,997).

A DONATION of one hundred guineas has been given by Imperial Chemical Industries, Ltd., to Westminster Hospital, in connection with the second "Westminster Hospital Week."

MR. WILLIAM BENNETT, M.Sc., A.I.C., colour chemist with Williams (Hounslow), Ltd., was married to Miss Florence Lumb, at St. Oswald's Church, Little Horton, Bradford, on Whit Monday.

DONATIONS of £100 from Chance Brothers and Co., Ltd., and of £52 10s. from the Institution of Gas Engineers have been received for the Lord Mayors' Fund for the relief of distress in the coalfields.

A CONCESSION FOR the establishment of a cement factory at Carandaby, Brazil, has been granted to a combination of Brazilian and Swiss capitalists. A small amount of cement is made in Brazil, but imports in the past few years have doubled.

FATAL INJURIES were sustained on May 30 by William Kane, aged 45, a boiler fireman, through being crushed between a platform and a brick wall at the Corporation Chemical Works, Glasgow, while endeavouring to secure a handbrake on an empty wagon.

A DRAFT of an Order in Council, to be known as the Merchandise Marks (Imported Goods) No. 2 Order, 1928, has been published by H.M. Stationery Office (price 2d.). It deals with the marking of pottery, insulated electric cables, electric incandescent lamps, enamelled zinc sheets, glue and gelatine, and tooth and shaving brushes. The draft is to be laid before Parliament.

BIOS No. 1, a product occurring in the muscular substance of the heart, in the lungs, kidneys, brain, etc., and in plants, is said to have been isolated by Professor W. Lash Miller and his collaborators at the University of Toronto. The chemical nature of the substance is unknown, but it is necessary for the growth of yeast, and its isolation may be of very great biochemical importance.

AN EXTRAORDINARY GENERAL MEETING of the United Molasses Co., Ltd., was held in London on Friday, June 1, when resolutions were passed increasing the capital from £1,500,000 to £3,000,000. An issue at par of £1,000,000 6 per cent. cumulative preference shares is being made by the company to provide funds for the acquisition of 75 per cent. of the outstanding capital stock of the Dunbar Molasses Corporation of America, and for other purposes.

PLANS FOR THE ERECTION of a sulphate of ammonia plant at Hopewell, Virginia, are to be carried into practice by the American Allied Chemical Co., which previously dropped the idea of erecting a plant owing to a fear of over-production in the world's fertiliser industry. Recent investigation into the world's needs of fertiliser has, however, changed this view, and the company is to erect a unit capable of producing from 80,000 to 100,000 tons of sulphate per annum.

THE ADVISORY COMMITTEE recently appointed by the President of the Scottish Board of Health (Sir John Gilmour, Secretary of State for Scotland) held its first meeting on Friday at the offices of the Board, 121A, Princes Street, Edinburgh, under the chairmanship of Sir John Findlay. Sir J. Gilmour, in receiving members of the committee, assured them that any practical proposals which they might put forward for reducing the pollution of rivers would receive sympathetic consideration.

THE THIRTY-FIRST annual general meeting of A. Boake Roberts and Co., Ltd., was held at Stratford on Tuesday. Mr. E. J. Boake referred to the increasing competition in the chemical trade, and also to the fact that in his opinion the Safeguarding of Industries' Act, while of benefit to the company, was inelastic and in some cases inadequate to deal with the more favourable conditions on the Continent. He referred to the successful result of the appeal that had been made to the Board of Trade in connection with the Act in relation to calcium biphosphate.

MR. H. R. PAYNE, of Imperial Chemical Industries, Ltd., presided at a meeting at York on Friday, June 1, of the editors of works magazines, under the auspices of the Industrial Welfare Society, when the function of such magazines in promoting friendly relations between employers and employees was discussed. At a luncheon held in connection with the conference a silver cigarette case was presented to Mr. Payne upon his relinquishing his post as editor to the Society. Mr. R. Lloyd Roberts, also of the I.C.I., proposed a vote of thanks to Mr. S. Rowntree, who presided at the luncheon.

SPEAKING AT THE ANNUAL MEETING of the Lagunas Nitrate Co., Ltd., in London, on May 31, Mr. R. E. Morris, the chairman, said that if the Chilean Government would make a clear cut in the export duty of 2s. per metric quintal, he was confident that within a comparatively short time the world would be calling for more Chilean nitrate than the country could produce. The Government would receive nearly £5,000,000 per annum, increasing annually, for duties on nitrate and iodine. Further, large bodies of men would be regularly employed in the manufacture of nitrate and iodine, its transport to the ports, and its subsequent shipment.

MR. W. BERRYMAN has been appointed managing director of the United Flexible Metallic Tubing Co., Ltd.

MR. F. B. MENADUE, chief chemist of the Barnet Glass Rubber Co., Ltd., has left Sydney on an extended business trip to Europe and America.

MR. WILLARD SNOW, metallurgist on the staff of the Electrolytic Zinc Co. at Hobart, Australia, has returned to Australia after a tour in the United States and Europe.

DR. TOSHIYUKI MAJIMA, professor of organic chemistry at the Tohoku Imperial University, is devoting himself to the collection and arrangement of chemical communications and papers published in the last 25 years in Japan.

PROFESSOR SIR WILLIAM POPE, as Prime Warden of the Goldsmiths Company, presided at a dinner given in the Goldsmiths' Hall, London, on Wednesday, to celebrate the completion of the Oxford English Dictionary.

THE PATENT ACTION of Sharpe and Dohme, Inc., *v.* Boots Pure Drug Company, Ltd., is reported in Report No. 6 (Vol. XLV) which is now on sale at the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

A SPANISH LEAD SYNDICATE has been formed by decree. It will have a sales monopoly. If external prices fall below a certain level, assistance will be given to the industry. The syndicate will have the power of closing mines and factories which are unprofitable.

THE TRUSTEE for the Dunstable Portland Cement Co., having received acceptances in respect of the minimum number of shares of the offer of the Associated Anglo-Atlantic Corporation and British Cement Products and Finance Co., the sale of the shares was completed on Thursday.

AN ISSUE was made on Monday in New York of $4,000,000 of the Koholyt Corporation's first closed mortgage 6½ per cent. sinking fund gold bonds, subject to Dawes Plan charges. The Koholyt Co. is a very large producer of chemical pulp, and is controlled by the Inveresk Paper Co. through ownership of stock.

PROFESSOR S. J. TRUSCOTT, president of the Institution of Mining and Metallurgy, at the end of the tour which the Institution has just made through the Cornish minefields, said that there were greater minefields still to be worked in Cornwall than in Bolivia, and he believed that within the next few years Cornish tin would again come into its own.

THE DEPARTMENT OF OVERSEAS TRADE announce that Colonel W. H. Franklin, His Majesty's Trade Commissioner in East Africa, will be in attendance at the offices of the Department for two weeks, commencing on June 4. Applications for interviews with Colonel Franklin should be addressed at once to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting the reference 4311/1/28.

THE ACTION BROUGHT by five young women against the United States Radium Co. for damages has been settled out of court. They were employed painting luminous watch dials, and it is stated that through their having to wet the brushes with their lips and tongues their skin was attacked by the radio-active substance employed. Each of them is to receive £2,000 cash, a pension of £120 a year, and £120 for medical expenses.

BEET SUGAR NEWS.—The net trading profit made by the Lincolnshire Beet Sugar Co. in its first year, which ended on March 31, 1928, amounted to £133,820. After repayment of the first instalment of £32,200 due on Trade Facilities Loan, setting aside £25,000 for depreciation, £18,000 for taxation, and £25,000 in reduction of preliminary expenses there is sufficient to pay a dividend of 7 per cent. on the preferred stock, with a small balance in hand.—A new company called the Second Lincolnshire Beet Sugar Co. has been formed for the purpose of constructing a second factory at Brigg. Capital has been subscribed privately, £60,000 having been invested in the second company by the Lincolnshire Beet Sugar Co.

ARTIFICIAL SILK NEWS.—It is announced that production at the Burton-on-Trent factory of the Branston Artificial Silk Co. will start on June 15. The plant is capable of producing four tons of viscose a week, but the factory has been built with a view to an extension to a production of ten tons per week.—Dr. Hartogs, managing director of the Dutch Enka Co., states that the company has decided to build an acetate silk factory in Holland. No production or price cartel, he said, was in operation between the Courtaulds, Glanzstoff, and Snia Viscosa groups, and he denied that any co-operation existed between Mr. Löwenstein and Glanzstoff for the acquisition of Enka shares, as had been recently reported. Enka had established a selling organisation in Spain, but is not building a factory there.—Negotiations are said to be proceeding with a view to the formation of an American subsidiary of Snia Viscosa. It is understood that Courtaulds and Glanzstoffs will be concerned in financing the company.

Obituary

DR. JENS P. LIHME, technical chemist to the Grasselli Chemical Co., of Cleveland, U.S.A., on April 1, at Lakewood, aged 80.

MR. W. J. ASQUITH, aged 74, recently. He was managing director of the British Association of Glass Bottle Manufacturers and a director of the Association of Glass Bottle Manufacturers of Great Britain and Ireland.

References to Current Literature

British

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FASTNESS OF DYES.—The fastness of dyed fabrics to laundering. R. G. Parker and D. N. Jackman. *J. Textile Institute*, May, pp. 223-232T.

GENERAL.—The formation and structure of cenospheres. F. S. Sinnatt. *J.S.C.I.*, June 1, pp, 151-155T.

Conditions governing the extraction of a solution by an immiscible solvent. E. L. Smith. *J.S.C.I.*, June 1, pp. 159-160T.

The higher-boiling constituents of the essential oil of hops. A. C. Chapman. *J. Chem. Soc.*, May, pp. 1303-1306.

Some experiments on intensive drying. R. H. Purcell. *J. Chem. Soc.*, May, pp. 1207-1218.

United States

CARBOHYDRATES.—Studies on reactions relating to carbohydrates and polysaccharides. XIII. Properties of gamma-delta-dihydroxy-carbonyl derivatives and their bearing on the polymerisation of polysaccharides. H. Hibbert and C. P. Burt. *J. Amer. Chem. Soc.*, May, pp. 1411-1416.

The mechanism of carbohydrate oxidation. VIII. The action of potassium hydroxide on fructose. W. L. Evans and J. E. Hutchmann. *J. Amer. Chem. Soc.*, May, pp. 1496-1502.

GENERAL.—Chemical microscopy. III. Its value in the training of chemists. E. M. Chamot and C. W. Mason. *J. Chem. Education*, May, pp. 536-548.

Sulphur dioxide and its aqueous solutions. I. Analytical methods, vapour density and vapour pressure of sulphur dioxide. Vapour pressure and concentration of the solutions. C. E. Maass and O. Maass. *J. Amer. Chem. Soc.*, May, pp. 1352-1368.

LABORATORY FITTINGS.—A new chemical laboratory fume duct system. F. C. Vilbrandt and J. T. Dobbins. *J. Chem. Education*, May, pp. 589-994.

ORGANIC.—Reactions of strongly electropositive metals with organic substances in liquid ammonia solution. VI. A. The reduction of benzophenone. B. The hydrolysis of methyl ketyls. C. B. Wooster. *J. Amer. Chem. Soc.*, May, pp. 1388-1394. Both mono- and di-sodium derivatives of benzophenone may be prepared by the action of sodium in liquid ammonia.

Esters of furoylacetic acid. J. E. Zanetti and C. O. Beckmann. *J. Amer. Chem. Soc.*, May, pp. 1438-1442. The methyl, *n*-propyl, and *n*-butyl esters of furoylacetic acid have been prepared, and their typical salts, oximes, and semicarbazones have been synthesised.

German

ADSORPTION.—The adsorption of ammonia, carbon dioxide, and benzene and acetone vapours by gels of titanic oxide and stannic oxide. N. J. Nikitin and W. J. Jurjew. *Zeitschrift anorganische Chem.*, Vol. 171, Parts 3-4, May 12, pp. 281-284.

ANALYSIS.—The Bunsen method of determining pyrolusite, etc. E. Rupp. *Chemiker-Zeitung*, May 30, pp. 429-430.

Simple and rapid microanalytic methods of investigating tobacco. I. The microtitrimetric determination of nicotine. J. Bodnàr, J. Straub, and V. L. Nagy. *Biochemische Zeitschrift*, Vol. 195, Parts 1-3, April 28, pp. 103-117.

The determination of the smallest quantities of mercury. A. Stock and W. Zimmermann. *Zeitschrift angewandte Chem.*, May 26, pp. 546-548.

A new rapid method of determination of organically-bound iodine. G. Pfeiffer. *Biochemische Zeitschrift*, Vol. 195, Parts 1-3, April 28, pp. 128-133.

Methods of determining paraffin hydrocarbons in benzoles of commerce and motor fuels. R. Heilingötter. *Chemiker-Zeitung*, June 2, pp. 437-438.

APPARATUS.—Apparatus for operating in the absence of air or in an atmosphere of neutral gas. P. Dickens. *Chemische Fabrik*, May 30, pp. 323-324.

ARTIFICIAL SILK.—The chemistry and physics of artificial silk. R. O. Herzog. *Zeitschrift angewandte Chem.*, May 26, pp. 531-536.

CATALYSIS.—Recent advances in the domain of heterogeneous catalysis. W. Frankenburger. *Zeitschrift angewandte Chem.*, May 26, pp. 523-531.

COLORIMETRY.—Selenium cells as colorimeters. A. Mickwitz. *Zeitschrift anorganische Chem.*, Vol. 171, Parts 3-4, May 12, pp. 285-311. A colorimeter of simple construction, involving the use of selenium cells, is described, which is especially suited to the investigation of very dilute coloured solutions. The method is applied to analysis.

CORROSION PREVENTION.—Metal spraying methods and prevention of corrosion. R. Hopfer. *Chemische Fabrik*, May 30, pp. 316-318.

GENERAL.—The manufacture of maize oil, and the recovery of the residues and of maize oil. I. O. K. A. Krizkovsky. *Chemiker-Zeitung*, May 30, pp. 425-428.

Explosives and accident prevention. W. Graulich. *Chemiker-Zeitung*, May 30, pp. 428-429.

Continuous or discontinuous nitrogenation of carbide. H. Pincass. *Die Metallbörse*, May 30, pp. 1181-1182. Deals with the conversion of calcium carbide to calcium cyanamide.

The synthesis of hydrochloric acid. B. Waeser. *Die Metallbörse*, May 30, pp. 1182-1183.

Iodine as a biogenetic element. XV. Animal organs and products and their iodine content. XVI. The occurrence of iodine in feeding stuffs and artificial fertilisers. K. Scharrer and J. Schwaibold. *Biochemische Zeitschrift*, Vol. 195, Parts 1-3, April 28, pp. 228-232, 233-237.

Methods for the preparation of active carbons. A. Bräuer and J. Reitstötter. *Zeitschrift angewandte Chem.*, May 26, pp. 536-539.

The isolation and detection of cellulose in peat. K. Hess and W. Komarewsky. *Zeitschrift angewandte Chem.*, May 26, pp. 541-542.

HEAT INSULATION.—Modern protection against heat and cold. J. S. Cammerer. *Chemische Fabrik*, May 30, pp. 318-320. Deals with the properties of heat-insulating materials, and their use in industry.

PHYSICAL CHEMISTRY.—Physical methods in the chemical laboratory. I. Introduction. F. Paneth.—II. Remarks on vacuum technique. K. Peters. *Zeitschrift angewandte Chem.*, May 26, pp. 507-508, 509-515.

SURFACE COMBUSTION.—Flameless surface combustion. Its significance for heat economy in the chemical industry. R. Schnabel. *Chemische Fabrik*, May 30, pp. 320-321.

Miscellaneous

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GENERAL.—The attack of mineral oils on cotton at high temperatures. H. Stäger. *Helvetica Chimica Acta*, Vol. XI, Part 3, pp. 379-386 (in German).

ORGANIC.—Researches on α-chloronaphthalene. I. The chlorination of naphthalene in the gas phase. P. Ferrero and R. Wunenburger. *Helvetica Chimica Acta*, Vol. XI, Part 3, pp. 416-425 (in French).

The synthesis of saccharose. A. Pictet and H. Vogel. *Helvetica Chimica Acta*, Vol. XI, Part 3, pp. 436-442 (in French).

Contributions to the knowledge of the catalytic reduction of hydrocyclic compounds. I. Derivatives of pulegone. II. The catalytic reduction of oxymethylenetetrahydrocarvone (carvomenthone). H. Rupe and K. Schäfer. *Helvetica Chimica Acta*, Vol. XI, Part 3, pp. 463-477 (in German).

Contributions to the knowledge of the carbon ring. X. On the monocyclic diketones of 16-, 18-, and 30-membered carbon rings. L. Ruzicka, W. Brugger, C. F. Seidel, and H. Schinz. *Helvetica Chimica Acta*, Vol. XI, Part 3, pp. 496–512 (in German.)

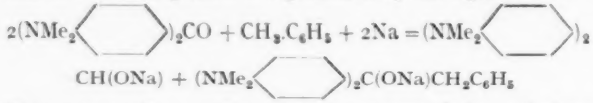
Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

289,571. Derivatives of Diaryl Ketones, Process for obtaining. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester, W. H. Cliffe, F. W. Linch, and E. H. Rodd, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, February 5, 1927.

Specification No. 272,321 (see The Chemical Age, Vol. XVII, p. 85) describes the reaction of sodium compounds of 4 : 4′-tetra-alkyl-diamino-benzo-phenones with aryl halides to obtain triaryl carbinol derivatives. It is now found that the sodium or other alkali metal compound of these ketones reacts with aromatic compounds containing methyl or methylene groups to yield condensation products which are carbinols in which the carbon atom of the ketone is united with the carbon atom of the methyl or methylene group. Thus the reaction product obtained from tetra-methyl-diamino-benzo-phenone, sodium, and toluene, can be treated with water to obtain tetramethyl-di-amino-benzhydrol, and tetramethyl-diamino-diphenyl-benzyl-carbinol. The formation of these compounds is represented by the equation :—



$$2(NMe_2C_6H_4)_2CO + CH_3C_6H_5 + 2Na = (NMe_2C_6H_4)_2CH(ONa) + (NMe_2C_6H_4)_2C(ONa)CH_2C_6H_5$$

The same reaction can be applied to an open chain methylene compound and to a cyclic or poly-cyclic compound containing at least one methylene group in a ring. Examples are given of the production of tetramethyl-diamino-diphenylbenzyl-carbinol, tetramethyl-diamino-diphenylstyrene, octamethyl-tetra-amino-tetraphenyl-ethanol, octamethyl-tetra-amino-tetra-phenyl-ethylene, tetramethyl-diamino-diphenyl acenaphthenyl-carbinol, 4 : 4′-tetramethyl-diamino-diphenyl-methylene-acenaphthene, and 4 : 4′-tetramethyl-diamino-diphenyl-methylene-fluorene.

289,585. Ketones of the Anthracene Series, Manufacture of. J. Y. Johnson. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 16, 1927.

Anthracyl-alkyl-ketones are obtained by the action of fatty acid halogenides and a condensing agent such as aluminium chloride on anthracene or its homologues or derivatives. When working at higher temperatures and for longer times α- or β-anthracyl-alkyl ketones or mixtures are obtained, and these may be converted into anthraquinone derivatives by treating with oxidising agents such as chromic acid dissolved in glacial acetic acid. When working at lower temperatures and for shorter times, or other milder conditions, meso-anthracyl alkyl-ketones are obtained. The latter compounds can be converted into the corresponding α- or β-anthracyl-alkyl ketones by the action of aluminium chloride under stronger conditions. A number of examples are given.

289,621. Montan Wax, Purification of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, April 8, 1927.

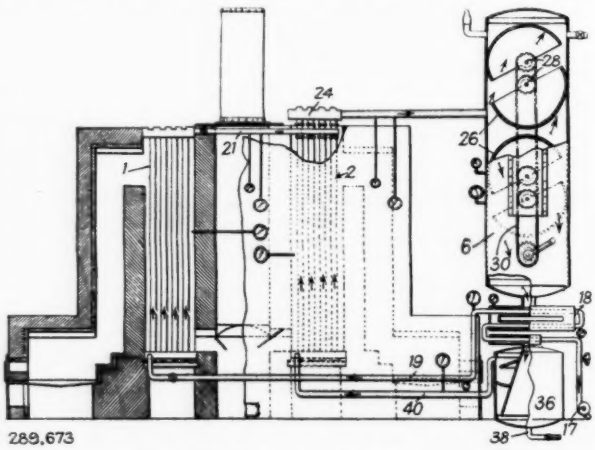
Montan wax is purified and whitened by treating with chromic acid in the presence of glacial acetic acid, with the addition of small quantities of sulphuric acid or acid salts of sulphuric acid or other acid. No carbonisation or saponification of the wax takes place.

289,639. Aluminium Oxide or Products Containing it, from Material Containing Aluminium Sulphide, Production of. T. R. Haglund, 8, Rue Runebergsgatan, Stockholm. Application date, May 3, 1927.

The process is more particularly for treating the slag obtained by smelting aluminous materials, heavy metal sulphides, and reducing agents as described in Specification No. 232,549. (See The Chemical Age, Vol. XII, p. 641). The slag is treated at a temperature below its melting point by an oxidising agent which decomposes hydrogen sulphide so that most of the sulphur is obtained in a form other than sulphuretted hydrogen. The oxidised slag is then treated for the separation of the fused aluminium oxide, or for purification of the oxidised product. The material is treated with a limited amount of air or with gases containing sulphur dioxide, so that the sulphur is obtained in the free state preferably in gaseous form. The reaction may alteratively be effected with an excess of oxygen so that sulphate is formed from the sulphide. The reaction may also be effected with gases containing carbon oxides so that the sulphur is obtained as CS_2 or COS. The material may subsequently be treated with water or steam, chlorine, or hydrochloric acid, to decompose any undecomposed aluminium sulphide.

289,673. Conversion of Heavy Hydrocarbons into Hydrocarbons of Lower Molecular Weight. A. D. Smith, c/o Cory Bros. and Co., Ltd., Coryton, Stanford-le-Hope, Essex, and J. Perl, 1775, Las Palmas Avenue, Los Angeles, Cal., U.S.A. Application date, July 12, 1927.

A heating coil 1 is supplied with crude oil by a centrifugal pump 17 discharging through the cooling coil 18 and pipe 19. The partly converted oil passes through pipe 21 and header 24 to a vertical still 6, where dephlegmation and further



289,673

cracking takes place. This is assisted by perforated hemispherical plates 26, mounted on shafts 28 which are geared together by a chain 30. When the plates are in their horizontal position the cross section of the still is closed, except for the perforations in the plates, or the plates may be set at any desired angle to produce the desired impedance. The oil is discharged over the cooling coil 18 to a chamber 36, and the semi-solid tars are drawn off through pipe 38. The liquid is returned through pipe 40 to a second heating coil 2, and is then added to the liquid from the coil 1. A temperature of about 850° F. is maintained in the heating coil 1, and a temperature of 700° F. in the heating coil 2 and still 6.

289,692. Condensation Products of the Naphthostyril Series, Manufacture of. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort on-Main, Germany. Application date, September 6, 1927.

Naphthostyril or a substitution product is condensed with a tertiary aromatic amine containing the group $\equiv C-N\langle^{C\equiv}_{C\equiv}$, or with a mono- or polyhydric phenol in the presence of phosphorus halides or thionyl chloride. The condensation products have the character of basic dyestuffs and greater fastness to light than triphenyl-methane dyestuffs. The products can be sulphonated to yield acid wool dyestuffs. Examples are given of the condensation of naphthostyril with dimethyl-aniline, methyl-benzyl-aniline, methyl-cyclo-hexyl-aniline, ethyl-benzyl-aniline, dibenzyl-aniline, N-ethyl carbazole, N-

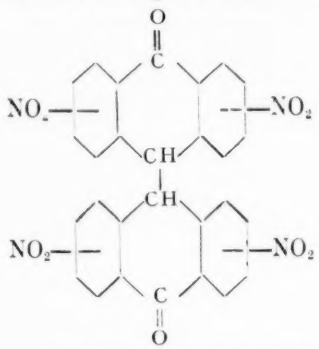
methyl-diphenyl-amine, or other tertiary aromatic amines, meta-diethyl-amino-phenetol, meta-chloro-dimethyl-aniline, pyrogallol, tetramethyl-ortho-phenylene-diamine, N.N.-dimethyl-1 : 2 : 3 : 4-tetrahydroquinoxaline.

289,950. SULPHATE OF AMMONIA, PREPARATION OF. S. Robson, The Bungalow, St. Andrews Road, Avonmouth, Gloucester. Application date, February 3, 1927.

Pure sulphate of ammonia is obtained by the interaction of ammonia, sulphur trioxide and water vapour. The sulphur trioxide is obtained by the oxidation of sulphur dioxide with the aid of a catalyst, and this oxidation should be as complete as possible. Two of the constituents may first be mixed and the third then added. Detailed examples are given.

289,958. TETRANITRO-DIANTHRONE AND 2 : 7-DINITROANTHRAQUINONE, MANUFACTURE OF. W. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 4, 1927.

Tetranitrodianthrone having the formula :—



is obtained by treating dianthrone with nitric acid and concentrated sulphuric acid in quantity sufficient for the introduction of four nitro groups into one molecule of dianthrone. The product may be converted into the enolic state by treating with a weak basic agent such as pyridine aniline, or weak alcoholic alkali. The product, or the tetranitrodianthrone, may be treated with a strong oxidising agent such as nitric acid, or glacial acetic acid and chromic acid, to obtain 2 : 7-dinitroanthraquinone.

289,959. ANHYDRIDES OF ACETIC ACID, ITS HOMOLOGUES AND HALOGEN DERIVATIVES, MANUFACTURE OF. W. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 4, 1927.

Organic acid anhydrides are now made by the interaction of a salt with an acid chloride, but this involves many difficulties due to the high vapour pressure of the acid chloride and the incompleteness of the reaction. These difficulties can be avoided if the reaction is effected in the presence of the corresponding free acid and if a chloride of silicon titanium, or tin is employed as the source of the chlorine. The reaction is rapid and practically quantitative, and the acid can be recovered by distillation. An example of the manufacture of acetic anhydride is given.

289,972. ANHYDRIDES OF ALIPHATIC ACIDS, MANUFACTURE OF. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, February 8, 1927.

Aliphatic anhydrides, particularly acetic anhydride, are obtained by subjecting the acid vapour to pyrogenic decomposition in the presence or absence of catalysts, and then passing the gases over water-binding substances such as bisulphates, pyrosulphates, zinc chloride, calcium chloride, ortho-, pyro-, or meta-phosphoric acid, but not sulphuric acid. The decomposition may be effected at 700°—1,000° C., and the temperature of the water-binding substance is substantially below this but above the boiling point of the anhydride under the existing pressure conditions. The water-binding substances are circulated continuously from the absorption zone to a regeneration zone, where the absorbed water is removed.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—262,774 (Soc. of Chemical Industry in Basle), relating to dyestuffs, see Vol. XVI, p. 189 ; 265,931 (Grasselli Chemical Co.) relating to aldehyde-amine condensation products, see Vol. XVI, p. 382 ; 263,758 (Deutsche Gasglulicht Auer.-Ges.) relating to catalysts for gas reactions, see Vol. XVI, p. 238 ; 266,311 (A. Gaertner) relating to conversion of coal into hydrocarbons, see Vol. XVI, p. 429 ; 271,491 (R. Battig) relating to obtaining hydrogen from coke oven gases, see Vol. XVII, p. 115 ; 279,133 (I.G. Farbenindustrie Akt.-Ges.) relating to water-soluble dinitroarylaminodiarylamines, see Vol. XVII, p. 578 ; 283,576 (Schering-Kahlbaum Akt.-Ges.) relating to 2-aminopyridines substituted in the 5-position by iodine, see Vol. XVIII, p. 248.

International Specifications not yet Accepted

288,206. VULCANISING RUBBER LATEX. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, April 4, 1927.

Coagulation of latex is prevented by a condensation product from naphthalene, formaldehyde, and sulphuric acid, or sulphonic acids of alkylated naphthalenes, or sulphonation products of oils, naphthenic, or fatty acids, and the latex is vulcanized by successive treatment with sulphur dioxide and sulphuretted hydrogen.

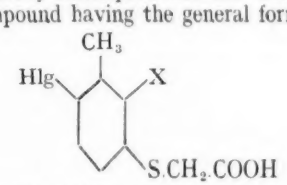
288,213. ACETALDEHYDE. Consortium für Elektrochemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, April 4, 1927.

Acetaldehyde is obtained by decomposing a vinyl ester with water, with the addition of a catalyst such as phosphoric, sulphuric, or organic sulphonic acids, sodium dihydrogen phosphate, sodium bisulphate, or alkaline agents. In the last instance, the aldehyde may be converted into aldol, crotonaldehyde, or aldehyde resin. A solvent such as the corresponding carboxylic acid may also be present.

288,214-5. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, April 4, 1927.

288,214. Dyestuffs suitable for making copying inks and pencils, printing pastes, and typewriter ribbons, are made by treating the diazo compound of a safranine with a β-diketone, *e.g.*, tolusafranine with acetylacetone. A number of examples are given.

288,215. Hydroxy-thionaphthenes are obtained by ring closure of a compound having the general formula :—



where Hlg represents halogen and X represents CN, $CONH_2$, or COOH. The hydroxy-thionaphthene may be oxidised or condensed with the usual indigoid components. Similar dyes are obtained by halogenating 4 : 4¹-dimethyl-thioindigo. Examples are given.

288,250. DECOMPOSING CHROMIUM ORES. Bozel-Malétra Soc. Industrielle de Produits Chimiques, 9, Rue de Milan, Paris. International Convention date, April 6, 1927.

Chromium ores are heated with alkalies in a pyrites furnace whereby the temperature may be 200°-300° C. less than that usually employed, and the recovery of the sodium chromate is easier.

288,253. ZINC CHLORIDE. Metallbank and Metallurgische Ges. Akt.-Ges., 45, Bockenheimer Anlage, Frankfort-on-Main, Germany. International Convention date, April 9, 1927.

Zinc oxide is heated to 300°-400° C. and treated with chlorine and water gas under such conditions that a temperature of 400°-500° C. is maintained by the heat of the reaction, and the fused zinc chloride is tapped off and filtered. The temperature of chlorination may alternatively be 700° C., in which case the zinc chloride is volatilised and then condensed.

288,291. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, April 9, 1927.

The dyes obtained by treating halogen-anthanthrones or their derivatives with aminoanthraquinones or their derivatives (see Specification 286,069, THE CHEMICAL AGE, Vol.

XVIII, p. 463) are further treated with a condensing agent to obtain new vat dyes. Thus, 2 : 7-dibrom-anthanthrone is condensed with 1-benzoylamino-4-methoxy-5-aminoanthraquinone, and the product treated with concentrated sulphuric acid. The dyestuff before treatment with sulphuric acid is greenish-grey, and after treatment is violet-brown.

LATEST NOTIFICATIONS.

290,997. Manufacture of N-oxyethyl-derivatives of 4-amino-1-oxybenzene. I.G. Farbenindustrie Akt.-Ges. May 23, 1927.

291,093. Method of heating stills, particularly for the steam-distillation of fatty acids. Metallbank und Metallurgische Ges. Akt.-Ges. May 27, 1927.

291,100. Manufacture of polysulphides of aromatic carboxylic acids and esters thereof. Eder, R. May 27, 1927.

291,018. Manufacture of physiologically-active substances from the anterior lobes of the hypophysis. I.G. Farbenindustrie Akt.-Ges. May 23, 1927.

291,032. Process for preparing lead electrodes. I.G. Farbenindustrie Akt.-Ges. May 24, 1927.

291,340. Manufacture of 7-acylamino-1:4-naphthoquinones. I.G. Farbenindustrie Akt.-Ges. May 28, 1927.

Specifications Accepted with Date of Application

266,007. Contact sulphuric acid process. Monsanto Chemical Works. February 15, 1926.

268,789. Diazotised mono-amines of the cyclic series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. March 30, 1926.

275,985. Magnesium alloys for use in connection with pistons for internal combustion engines. I.G.Farbenindustrie Akt.-Ges. August 13, 1926.

282,629. Vat dyestuffs, Manufacture and production of. I.G. Farbenindustrie Akt.-Ges. December 23, 1926.

282,658. Exothermic chemical reactions under pressure and at a high temperature, Processes for carrying out. Soc. l'Air Liquide, Soc. Anon. pour l'etude de l'Exploitation des Procédés G. Claude. Deecember 24, 1926. Addition to 268,721.

290,719. Alkali and alkaline earth hydroxides, Apparatus for use in the manufacture of. K. Carpmael and K. S. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). February 16, 1927.

290,720. Dyeing of esters and ethers of cellulose and its conversion products. K. Carpmael and K. S. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). February 16, 1927.

290,733. Azo dyestuffs which are insoluble in water, Manufacture of. K. Carpmael and K. S. Carpmael. (*I.G. Farbenindustrie Akt-Ges.*). February 18, 1927.

290,749. Alkali iodates, Manufacture of. K. Carpmael and K. S. Carpmael. (*I.G. Farbenindustrie Akt-Ges.*). February 22, 1927.

290,750. Electrolytic manufacture of compounds containing active oxygen. K. Carpmael and K. S. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). February 22, 1927.

290,793. Purifiers for use in the manufacture of gas. Whessoe Foundry and Engineering Co., Ltd., and R. L. Chambers. April 1, 1927.

290,840. Purification of aromatic hydrocarbons. H. G. C. Fairweather. (*Selden Co.*). June 7, 1927.

290,860. Sodium nitrate, Process for the recovery of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). July 21, 1927.

264,528 and 270,640. Alloys of high melting point. A. Kropf. January 16, 1926, and May 10, 1926.

286,290. Phosphorus, phosphoric acid and hydrogen, Manufacture of. Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. March 3, 1927.

290,399. Catalysts for the catalytic production of methanol and other oxygenated organic compounds from carbon and hydrogen. Synthetic Ammonia and Nitrates, Ltd., and R. G. Franklin. November 15, 1926.

290,683-4. Titanium compounds, Preparation of. P. Spence and Sons, Ltd., and S. F. W. Crundall. November 17, 1926.

290,690. Dyes. B. Wylam, J. E. G. Harris, J. Thomas, and Scottish Dyes, Ltd. December 17, 1926.

273,337. Low boiling point hydrocarbons, Production of—by the destructive hydrogenation of tars, coals, mineral oils, and the like. I.G. Farbenindustrie Akt.-Ges. June 26, 1926.

Applications for Patents

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Elimination of obnoxious substances from waste gases, etc. 15,925. May 31.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of phosphoric acid. 15,926. May 31.

Davidson, A., Imperial Chemical Industries, Ltd., Tatum, W. W. and Watts, G. E. Manufacture of sulphonated aminoanthraquinone. 15,839. May 30.

Deguide, C. Manufacture of zinc pigment. 15,647. May 29. (Luxemburg, May 30, 1927.)

Dreyfus, H. Dyeing, etc., materials made of cellulose derivatives. 16,138, 16,139. June 2. (December 14, 1926.)

Du Pont de Nemours and Co., E. I., and Nobel Industries, Ltd. Preparation of chemical substances. 16,077. June 1.

Goodyear Tyre and Rubber Co. Manufacture of synthetic rubber. 15,982. May 31. (United States, September 13, 1927.)

Graesser-Monsanto Chemical Works, Ltd., and Hudson, D. P. Production of aromatic alkoxyaldehydes. 15,785. May 30.

Hackford, J. E. Low-temperature carbonisation of coal, etc. 16,070. June 1.

Hetherington and Sons, Ltd., J. Recovery of caustic soda from lyes. 15,991. June 1.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Apparatus for manufacture of fuel gas. 15,678. May 29.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of compact masses from pulverulent metallic oxides. 15,679. May 29.

I.G. Farbenindustrie Akt.-Ges. and Imray, O. Y. Colouring hydrocarbon oils, etc. 15,936. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of dyestuffs. 15,949. May 31. (March 18, 1927.)

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of 1.1′ dihydroxy 2.2′ dianthraquinonyl. 15,950. May 31. (March 18, 1927.)

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Cleaning seating surfaces of valves, etc. 15,952. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of alkali nitrates. 15,953. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Operating internal-combustion engines with pulverulent fuel. 15,954. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Removal of residues of combustion from internal-combustion engines. 15,955. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson J. Y. Improving spinning properties of cotton. 15,956. May 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson J. Y. Emulsifying diolefines. 16,064. June 1.

I.G. Farbenindustrie Akt.-Ges. and Imray, O. Y. Manufacture of vat dyestuffs. 16,094. June 1.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of products from organised substances. 16,173. June 2.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of lacquers. 16,174. June 2.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of combustible gases from granular, etc., fuels. 16,175. June 2.

I.G. Farbenindustrie Akt.-Ges. Fertilisers. 15,660. May 29. (Germany, June 13, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of 7 acylamino-1:4 naphthoquinones. 15,690. May 29. (Germany, May 28, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of cellulose esters. 15,822. May 30. (Germany, May 30, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of dyestuffs. 15,823. May 30. (Germany, May 30, 1927.)

I.G. Farbenindustrie Akt.-Ges. Carbon disulphide. 15,859. May 30. (Germany, May 31, 1927.)

I.G. Farbenindustrie Akt-Ges. Manufacture of derivatives of ethylene, etc. 15,927. May 31. (Germany, June 11, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of nitrogenous dyestuffs. 15,951. May 31.

I.G. Farbenindustrie Akt.-Ges. Manufacture of lead electrodes for accumulators. 16,095. June 1. (Germany, June 1, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of fertilisers. 16,187. June 2. (Germany, June 11, 1927.)

Marks, E. C. R., and Titanium, Ltd. Production of alkali-earth titanates. 15,720. May 29.

Pennell, R. H. L. Filtration of liquids. 16,093. June 1.

Speight, E. A. Dyeing cellulose esters, etc. 15,840. May 30.

Welffens, E. J. Recovery of caustic soda from lyes. 15,991. June 1.

A Dyeing Stoppage Probable

A DISQUIETING development in the dyeing and finishing dispute took place on Wednesday. After a meeting at Bradford of the joint executive of the various unions in the industry, Mr. Arthur Shaw announced that he had resigned the secretaryship of the executive, and that his own union (the National Union of Textile Workers) had decided to withdraw from it. His union had decided to instruct its members in the dyeing industry to give a week's notice to cease work at the end of next week, at all firms where collective piecework had not been introduced. Other unions failed to come to a decision. The Amalgamated Society of Dyers and Kindred Trades has issued ballot papers to members in the West of Scotland, for and against a stoppage of work to enforce certain wages demands recently refused by the employers.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages extra.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated £19 per ton; powder, £21 per ton. (Packed in 2-cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s 6d. to 1s. 11d. per gall.; pyridinised industrial, 1s. 8d. to 2s. 1d. per gall.; mineralised, 2s. 7d. to 2s. 11d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6¼d. to 6¾d. per lb. Crude 60's, 2s. 3d. to 2s. 4d. per gall. prompt.

ACID CRESYLIC 99/100.—2s. 8d. to 3s. per gall. 97/99.—2s. 7d. to 2s. 9d. per gall. Pale, 95%, 2s. 5d. to 2s. 7d. per gall. Dark, 2s. to 2s. 3d.

ANTHRACENE.—A quality, 2½d. per unit. 40%, £5 per ton.

ANTHRACENE OIL, STRAINED.—8d. to 8½d. per gall. Unstrained, 7¾d. to 8d. per gall.

BENZOLE.—Prices at works: Crude, 10½d. to 11d. per gall.; Standard Motor, 1s. 4½d. to 1s. 5d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 7d. to 2s. per gall. Firm. Pure, 1s. 10d. to 2s. 2d. per gall.

XYLOL.—1s. 1d. to 1s. 11d. per gall. Pure, 2s. 4d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. per gall.; middle oil, 7d. to 8d. per gall. Heavy, 8¼d. to 8½d. per gall. Standard specification, 6¾d. to 7d. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8½d. to 9½d. per gall. Solvent 90/160, 1s. 1½d. to 1s. 2d. per gall. Solvent 95/160, 1s. 2d. to 1s. 8d. per gall. Solvent 90/190, 9½d. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £5 per ton. Whizzed, £8 per ton. Hot pressed, £8 10s. to £9 per ton.

NAPHTHALENE.—Crystals, £13 to £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 62s. 6d. to 65s. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 5s. to 6s. per gall. 90/180, 3s. to 4s. 6d. per gall. Heavy, 2s. 6d. to 3s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100 %.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—5½d. per lb.

m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.

p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.

DICHLORANILINE.—2s. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITHROBENZENE.—8½d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—2s. 1½d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £10 5s. per ton. Good demand. Grey, £14 10s. to £15 per ton. Liquor, 9d. per gall.

CHARCOAL.—£6 to £9 per ton, according to grade and locality. Foreign competition severe.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10d. per gall.

WOOD CREOSOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 11d. to 4s. 3d. per gall. Solvent, 4s. 3d. per gall.

WOOD TAR.—£4 to £5 per ton.

BROWN SUGAR OF LEAD.—£40 15s. per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 5½d. per lb., according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 6d. to 2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 1d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5¾d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPHONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. to 6s. 3d. per lb.

ZINC SULPHUR.—1s. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£30 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 5d. to 2s. 8d. per lb.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 11d. to 2s. per lb. Less 5%.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d. per lb.
ACID, SALICYLIC, B.P. PULV.—1s. 2d. to 1s. 6d. per lb. Technical.—10½d. to 11½d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 4½d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—8s. to 8s. 3d. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
ATROPINE SULPHATE.—9s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. 3d. per lb. spot.
BISMUTH CARBONATE.—11s. 4d. to 11s. 7d. per lb.
BISMUTH CITRATE.—10s. 4d. to 10s. 7d. per lb.
BISMUTH SALICYLATE.—10s. 7d. to 10s. 10d. per lb.
BISMUTH SUBNITRATE.—9s. 7d. to 9s. 10d. per lb.
BISMUTH NITRATE.—6s. 7d. to 6s. 10d. per lb.
BISMUTH OXIDE.—14s. 7d. to 14s. 10d. per lb.
BISMUTH SUBCHLORIDE.—14s. 4d. to 14s. 7d. per lb.
BISMUTH SUBGALLATE.—8s. 7d. to 8s. 10d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 1½d. per lb.; 12 W. Qts. 1s. 0½d. per lb.; 36 W. Qts., 1s. per lb.
BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Ammonium, 2s. 1d. to 2s. 3d. per lb.; potassium, 1s. 9¾d. to 1s. 11¾d. per lb.; sodium, 2s. to 2s. 2d. per lb.; granulated, ¼d. per lb. less; all spot. Large quantities at lower rates.
CALCIUM LACTATE.—1s. 2d. to 1s. 3d. per lb.
CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. ·730—11½d. to 1s. 0½d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE.—£39 per ton, in barrels ex wharf.
GUAIACOL CARBONATE.—4s. 9d. to 5s. per lb.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
IRON AMMONIUM CITRATE.—B.P., 2s. 6d. to 2s. 9d. per lb. Green, 2s. 9d. to 3s. 2d. per lb.; U.S.P., 2s. 7d. to 2s. 10d. per lb.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb., in 1 cwt. lots.
MENTHOL.—A.B.R. recrystallised B.P., 16s. per lb. net for January delivery; Synthetic, 9s. to 10s. per lb.; Synthetic detached crystals, 9s. to 12s. 6d. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.
MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, 7s. 6d. to 7s. 7d. per lb., levig., 7s. to 7s. 1d. per lb.; Corrosive Sublimate, Lump, 5s. 9d. to 5s. 10d. per lb., Powder, 5s. 2d. to 5s. 3d. per lb.; White Precipitate, Lump, 5s. 11d. to 6s. per lb., Powder, 6s. to 6s. 1d. per lb., Extra Fine, 6s. 1d. to 6s. 2d. per lb.; Calomel, 6s. 4d. to 6s. 5d. per lb.; Yellow Oxide, 6s. 10d. to 6s. 11d. per lb.; Persulph., B.P.C., 6s. 1d. to 6s. 2d. per lb.; Sulph. nig., 5s. 10d. to 5s. 11d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 5d. to 1s. 9d. per lb.
METHYL SULPHONAL.—9s. to 9s. 3d. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.
PHENACETIN.—2s. 6d. to 2s. 9d. per lb.
PHENAZONE.—4s. to 4s. 3d. per lb.
PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—100s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 4d. to 2s. 7d. per lb.; U.S.P., 2s. 3d. to 2s. 6d. per lb.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included, f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—47s. per lb.; in quantity lower.
SALOL.—2s. 4d. per lb.
SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.
SODIUM CITRATE, B.P.C., 1911—2s. 1d. to 2s. 4d. per lb., B.P.C. 1923—2s. 6d. to 2s. 7d. per lb. U.S.P., 2s. 4d. to 2s. 7d. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. Crystals, 5s. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 7d. to 1s. 9d. per lb. Crystal, 1s. 8d. to 1s. 10d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—6s. 9d. to 7s. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 2d. per lb.
THYMOL.—Puriss., 9s. 6d. to 9s. 9d. per lb., according to quantity. Firmer. Natural, 14s. 3d. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—10s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL SALICYLATE.—2s. 9d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 3d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL BENZOATE.—2s. 6d. per lb.
CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.
COUMARIN.—9s. 9d. per lb.
CITRONELLOL.—13s. 6d. per lb.
CITRAL.—8s. 3d. per lb.
ETHYL CINNAMATE.—6s. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—10s. 6d. per lb.
GERANIOL (PALMAROSA).—22s. per lb.
GERANIOL.—6s. 6d. to 11s. per lb.
HELIOTROPINE.—4s. 9d. per lb.
ISO EUGENOL.—14s. 6d. per lb.
LINALOL.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 10s. 6d. per lb.
LINALYL ACETATE.—Ex Shui Oil, 14s. 6d. per lb. Ex Bois de Rose, 18s. 6d. per lb.
METHYL ANTHRANILATE.—8s. 6d. per lb.
METHYL BENZOATE.—4s. per lb.
MUSK KETONE.—35s. per lb.
MUSK XYLOL.—7s. per lb.
NEROLIN.—3s. 6d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—10s. 6d. per lb.
RHODINOL.—38s. per lb.
SAFROL.—1s. 6d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN.—15s. 3d. to 16s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. 6d. per lb.
ANISE OIL.—2s. 9d. per lb.
BERGAMOT OIL.—26s. per lb.
BOURBON GERANIUM OIL.—20s. per lb.
CAMPHOR OIL.—9d. per lb.
CANANGA OIL, JAVA.—12s. 9d. per lb.
CINNAMON OIL LEAF.—6s. 9d. per oz.
CASSIA OIL, 80/85%.—8s. per lb.
CITRONELLA OIL.—Java, 2s. 4d. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. per lb.
CLOVE OIL.—6s. 6d. per lb.
EUCALYPTUS OIL, AUSTRALIAN, 70/75%.—2s. 1d. per lb.
LAVENDER OIL.—Mont Blanc, 48/50%, Esters, 16s. per lb.
LEMON OIL.—13s. per lb.
LEMONGRASS OIL.—4s. 3d. per lb.
ORANGE OIL, SWEET.—45s. per lb.
OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 55s. per oz.
PALMA ROSA OIL.—14s. 6d. per lb.
PEPPERMINT OIL.—Wayne County, 15s. per lb.; Japanese, 7s. per lb.
PETITGRAIN.—7s. 3d. per lb. Sandalwood, Mysore, 26s. 6d. per lb., 90/95%, 16s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, June 7, 1928.

INQUIRY during the past week has only been of moderate volume, prices on the whole continuing firm. Export inquiry appears to be improving, although much of the business offering is unacceptable owing to the low limits placed upon the orders.

General Chemicals

ACETONE continues in steady request and unchanged in price at £65 to £67 per ton, and the market holds firm.

ACID ACETIC.—The London price remains unchanged with inquiry fair.

ACID FORMIC continues active and unchanged in price at £47 for the 85%.

ACID LACTIC is in steady request at about £43 for best 50% by weight, pale quality.

ACID OXALIC is firm at £31 to £32 with inquiry moderate.

ACID TARTARIC is in better request and firm at 1s. 4½d. to 1s. 5d.

AMMONIUM CHLORIDE is dull, but unchanged in price at about £19 to £20 for fine white crystals.

ALUMINA SULPHATE continues active and very firm with near supplies rather short. Current price £6 to £6 10s. for 17/18%.

ARSENIC is unchanged in price with inquiry steady.

BARIUM CHLORIDE has advanced and is in rather short supply for near delivery. Price about £8 10s. to £9 per ton, with the forward position very firm.

COPPER SULPHATE continues in active demand, especially on export account, and price holds firm.

CREAM OF TARTAR is maintained at £104, less 2½% for best 99/100% B.P. qualities, with inquiry improving.

FORMALDEHYDE has been in good request and price shows no change at £39 10s. for 40% volume in usual casks.

LEAD ACETATE is firm and in steady demand; white at £41 10s. to £42 10s., with brown £1 per ton less.

LEAD NITRATE is unchanged at £37 per ton.

LIME ACETATE continues firm and in good request with supplies of grey quality still rather short.

METHYL ACETONE has been in good demand and price keeps firm at £56 to £58 per ton for 45%.

POTASSIUM CARBONATE AND CAUSTIC is unchanged.

POTASSIUM CHLORATE is steady at 3d. to 3½d. per lb. with moderate demand.

POTASSIUM PERMANGANATE is firmer and in good request with B.P. qualities quoted at 5¼d. and commercial ½d. per lb. less.

POTASSIUM PRUSSIATE maintains its advanced price and inquiry is good. Present price £63 10s. to £65 10s., according to quantity.

SODA ACETATE is still in short supply with an active demand and price firm at £21 15s. to £22.

SODIUM PHOSPHATE is steady and in fair request at about £13.

SODIUM PRUSSIATE is in good demand and price firm at 5d. per lb.

SODIUM SULPHIDE is unchanged and in moderate demand.

TARTAR EMETIC is steady at 11½d. to 11¾d. per lb., with a fair demand.

ZINC SULPHATE is unchanged at about £12.

Coal Tar Products

The market for coal tar products remains quiet, and there is little change in prices to report from last week.

MOTOR BENZOL is being quoted at 1s. 5d. to 1s. 5½d. per gallon, on rails.

SOLVENT NAPHTHA is quoted at 1s. 1d. to 1s. 2d. per gallon, on rails, at works.

HEAVY NAPHTHA is quoted at 1s. 1d. to 1s. 2d. per gallon, on rails, at works.

CREOSOTE OIL remains weak, the price in the North for the forward position being 6½d. per gallon, on rails, while the price in London is 7d. per gallon.

CRESYLIC ACID.—There are fair quantities being placed on a weak market, with very few orders, and there is a downward tendency. Prices, however, remain about the same, namely, 2s. 6d. per gallon f.o.b. for the 98/100% quality, and about 1s. 10d. to 1s. 11d. per gallon for the dark, 95/97% quality.

NAPHTHALENES remain slightly weaker, the 74/76 quality being quoted at £6 per ton, and the 76/78 quality at £6 10s. to £7 per ton.

PITCH remains stationary, very little business being reported. There is some inquiry for forward.

Latest Oil Prices

LONDON, June 6.—LINSEED OIL weak at 5s. to 7s. 6d. per ton decline. Spot, ex mill, £30 10s.; June, £29 10s.; July-August, £29 10s.; September-December, £30 5s.; January-April, £30 12s. 6d. naked. RAPE OIL quiet. Crude extracted, £42; technical refined, £44, naked, ex wharf. COTTON OIL steady. Egyptian crude, £35; refined common edible, £40; deodorised, £42 per ton, naked. TURPENTINE firm but quiet at 9d. per cwt. advance. American, spot, 40s. 3d.; July-December, 42s. 9d.

HULL, June 6.—LINSEED OIL.—Spot, £29 10s.; June, £29 10s.; July-August, £29 12s. 6d.; September-December, £30 2s. 6d. per ton, naked. COTTON OIL.—Bombay crude, £31 5s.; Egyptian, crude, £34 10s.; edible refined, £37 10s.; technical, £35; deodorised £39 10s. per ton, naked. PALM KERNEL OIL.—Crushed, 5½ per cent., £38 10s. per ton, naked. SOYA OIL.—Extracted and crushed, £33 5s.; deodorised, £36 15s. per ton. RAPE OIL.—Crude extracted, £40 15s.; refined, £42 15s. per ton, net cash terms, ex mill. TURPENTINE, CASTOR OIL, and COD OIL unchanged.

South Wales By-Products

BUSINESS in South Wales by-products continues on quiet lines and values generally show no appreciable change. Pitch remains quite inactive and prices are nominal on the basis of from 57s. 6d. to 62s. 6d. per ton f.o.b., and about 65s. per ton, delivered. Naphthas continue to be in poor demand and prices tend to ease. Heavy naphtha has weakened from 1s. 1d. and 1s. 2d. per gallon to round about 11d. to 1s. 1d. per gallon. Solvent naphtha, however, is steady from 1s. 1d. to 1s. 5d. per gallon. Creosote remains quiet, with hardly any call, but prices are being maintained at 7d. and 8d. per gallon. Road tar has a better demand and inquiries are more numerous, but, owing to the weakness of pitch and creosote, values continue to be easy from 18s. to 23s. per barrel of 40 gallons. Refined tars show no change, coke oven tar changing hands at from 7¾d. to 8¼d. per gallon delivered, and gasworks' tar at from 7¼d. to 7¾d. per gallon. Crude tar has a moderate call round about 50s. per ton, f.o.r. Patent fuel and coke exports are slightly better, but are not satisfactory. Patent fuel, for export, from Cardiff is unchanged at from 21s. to 22s. per ton, while at Swansea it has eased slightly to 20s. and 20s. 6d. per ton. Coke, best foundry, is steady at from 32s. 6d. to 37s. per ton, furnace at 19s. to 21s. per ton, and other sorts from 25s. to 32s. 6d. per ton.

Nitrogen Products

Export.—As is usual for this season of the year, the demand is not very strong, because buyers tend to hold off in view of reductions in prices. At the moment the price f.o.b. U.K. port is £9 12s. per ton, in single bags. It is anticipated that the price will recede as the month advances. This will probably be due to anxiety of small sellers concerning disposal of stocks. On account of phenomenal stocks remaining over at the end of the season, the nitrogen market tends to be very firm. Home prices operating for March-May delivery will be continued to the end of June and probably to the end of July. It is not expected that the prices scale for 1928–29 will be lower than that of 1927–28.

Nitrate of Soda.—Producers continue to hold for 16s. 6d. per metric quintal f.a.s. Chile, but buyers are resisting this price. As a consequence, sales are only on a hand-to-mouth basis. Developments are awaited with interest.

Chemical Engineers Tour

IT is reported that the bookings for the tour of the Chemical Engineers to Canada and the United States, in August, now number about 150. This being quite double the number originally estimated, the Raymond and Whitcomb Co., London, who are making the travelling arrangements, have engaged additional accommodation on the White Star liner *Regina*, and it is understood that the party will be about equally divided between this steamer and the White Star liner *Megantic*. As already announced, the *Megantic* will sail from London on Friday, August 10, and from Southampton on the following day. The *Regina* will sail from Liverpool on Friday, August 10, calling at Belfast and Glasgow. The bulk of the party are expected to return from New York on the White Star liner *Celtic* on Saturday, September 8, although alternative sailings are available for those who prefer other arrangements.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinion.*

GLASGOW, *June 6, 1928.*

BUSINESS in the heavy chemical market has been moderately active during the past week, but the amount of inquiry going around has not indicated any business of much importance. There are no changes in prices to record.

Industrial Chemicals

ACETONE, B.G.S.—£64 to £67 per ton, ex store, according to quantity.

ACID ACETIC.—98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powdered, £32 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 7d. per lb., delivered. In moderate demand.

ACID CITRIC, B.P.—Rather easier and now offered for spot delivery at 1s. 11½d. per lb., less 5%; ex store quoted 1s. 11¾d. per lb. less 5%, ex wharf, to come forward.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality 4s. per carboy. Dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC.—80° quality £24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer from the continent at 3¼d. per lb., ex wharf. Spot material quoted 3½d. per lb., ex store. In better demand.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality; £5 15s. per ton for 168° quality. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Now quoted 1s. 4¼d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17 18%, IRON FREE.—Quoted £5 10s. per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £5 15s. per ton, ex store.

ALUM, LUMP POTASH.—Spot material available at about £9 per ton, ex store. Crystal meal quoted £8 10s. per ton, ex store. Lump quality on offer from the continent at £8 5s. per ton, c.i.f. U.K. ports.

AMMONIA, ANHYDROUS.—Now quoted 10d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £30 per ton, packed in 5 cwt. casks, delivered or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Continental about £19 per ton, c.i.f. U.K. ports. Fine white crystals of continental manufacture quoted £16 15s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—On offer for prompt dispatch from mines at £19 per ton, ex wharf. Spot material quoted £20 per ton, ex store.

BARIUM CARBONATE, 98/100%.—English material on offer at £7 5s. per ton, ex store. Continental quoted £7 per ton, c.i.f. U.K. ports.

BARIUM CHLORIDE.—98/100%, large white crystals quoted £6 15s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers £6 12s. 6d. per ton, delivered minimum 4-ton lots. Continental on offer at £6 10s. per ton, ex wharf.

CALCIUM CHLORIDE.—British manufacturers' price £4 5s. to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports for export.

COPPER SULPHATE.—Quoted £24 10s. per ton, c.i.f. U.K. ports, but some spot parcels available at somewhat less.

FORMALDEHYDE, 40%.—Quoted £35 10s. per ton, c.i.f. U.K. ports. Spot material now on offer at £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 15s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material on offer at £31 per ton, ex store.

LEAD, WHITE.—Quoted £31 10s. per ton, ex store.

LEAD ACETATE.—White crystals quoted £39 15s. per ton, c.i.f. U.K. ports; brown, £32 10s. per ton, c.i.f. U.K. ports. Spot material on offer at £42 15s. per ton, ex store, spot delivery.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

METHYLATED SPIRIT.—Industrial quality, 64° O.P., quoted 1s. 7d. per gallon, less 2½%, delivered.

POTASSIUM BICHROMATE.—4½d. per lb. delivered, minimum 4-ton lots. Under 4-ton lots, ⅛d. per lb. extra.

POTASSIUM CARBONATE, 96/98%.—Quoted £25 10s. per ton, ex wharf, prompt shipment from the Continent. Spot material available at £26 10s. per ton, ex store.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £23 10s. per ton, c.i.f. U.K. ports; crystals 30s. per ton extra; B.P. quality crystals or powder offered at £32 per ton, c.i.f. U.K. ports.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Unchanged at about 6¼d. per lb., ex store, spot delivery. Offered from the Continent at 6⅜d. per lb.

SODA CAUSTIC.—Powdered, 98/99%, £17 17s. 6d. per ton; solid, 76/77%, £14 10s. per ton, and 70/72%, £13 12s. 6d. per ton, minimum 4-ton lots carriage paid on contract. Spot material 10s. per ton extra.

SODIUM ACETATE.—Spot material on offer at about £22 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3d. per lb., delivered buyers' works, minimum 4-ton lots. Under 4 and over 2-ton lots 3 1/16d. per lb. Under 2-ton lots 3¼d. per lb.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 3s. 9d. per ton, ex quay, minimum 4-ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots.

SODIUM NITRATE.—Quoted £11 per ton, ex store.

SODIUM NITRITE, 100%.—Quoted £19 10s. per ton, ex store.

SODIUM PRUSSIATE.—In moderate demand. Spot material now quoted 4¾d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, for unground quality; 52s. 6d. per ton delivered. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 per ton; broken, 60/62%, £10 per ton; crystals, 30/32%, £7 2s. 6d. per ton, delivered. Buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 15s. per ton; rock, £10 12s. 6d. per ton; ground American, £9 5s. per ton; ex store. Prices nominal.

ZINC CHLORIDE.—British material, 98/100%, quoted £24 15s. per ton, f.o.b. U.K. ports; 98/100% solid on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Powdered 20s. per ton extra.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf, prompt shipment from the Continent.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Ruhr Gas Expansion Plans

To finance a widespread expansion of its gas distributing system, which it is planned to extend from the Ruhr as far north as Hamburg and the North Sea coast, the Ruhr Gas Corporation, a company backed by 52 leading Ruhr coal and steel concerns, has just contracted a 25-year 6 per cent. $10,000,000 loan with an American banking consortium, headed by Dillon Read and Co. and Halsey Stuart and Co. The shareholders of the Corporation, which was formerly known as the A.G. für Kohleverwertung, control 90 per cent. of the Ruhr coal-mining capacity, and include the United Steel Works Corporation, and the Krupp, Stinnes, Mannesmann, Goodhope, Harpen and other well-known concerns. Between them they possess a greater aggregate of assets than any other industrial combine yet financed in Germany. It is stated that the present development is part of a general plan on the part of the Ruhr heavy industry to make commercial use of every possible coal by-product. It is estimated that the industries associated in the Ruhr Gas Corporation produce between them an annual surplus of 9,000 million cubic metres of coke-oven gas. All this is to be utilised for commercial gas production.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, June 7, 1928.

If the chemical market here has not wholly recovered from the inaction due to the Whitsun holidays it is rapidly doing so, and the expectation is that early next week conditions will, at all events, be back to where they were a fortnight ago. There has been a moderate volume of inquiry about for spot parcels, most of them relating to comparatively small quantities. Deliveries against contracts, however, are reported to be on a fairly satisfactory scale. Taking the market generally, values continue steady.

Heavy Chemicals

Bichromate of soda is well held at from 3d. to 3¼d. per lb., according to quantity, and moderate sales of this material are reported. There has not been a great deal of business put through this week in the case of chlorate of soda, but at round 3d. per lb. there has been little change in prices. Sulphide of sodium meets with a quiet demand, with the 60–65 per cent. solid quality quoted at about £10 per ton, and the commercial grade at from £7 15s. to £8. Phosphate of soda is in moderate request, with current offers in the neighbourhood of £12 2s. 6d. per ton. Caustic soda is moving off in fair quantities at firm prices, these ranging from £13 7s. 6d. to £15 7s. 6d. per ton. Contract quotations for bleaching powder remain at about £7 per ton, but buying interest this week has been on somewhat quiet lines. With regard to prussiate of soda, there is a quietly steady demand about for this material at from 4½d. to 5d. per lb., according to quantity. Saltcake shows little change in the price situation, a quiet business being put through at from £2 12s. 6d. to £2 15s. per ton. There has been rather less doing this week in nitrite of soda, but values are firm at from £19 to £19 10s. per ton. Contract quotations for alkali and bicarbonate of soda are maintained at £6 2s. 6d. and £10 10s. per ton, respectively, and a quietly steady trade is passing in each case. Hyposulphite of soda seems to be one of the few easy sections, photographic quality being obtainable at from £15 10s. to £16 per ton, and commercial at £9 5s.

Permanganate of potash is selling in comparatively limited quantities, but prices are about unchanged at 5¼d. per lb. for B.P. and 4¾d. for commercial. Bichromate of potash is attracting a moderate amount of attention, an average quotation to-day being about 4d. per lb. Chlorate of potash keeps fairly steady at 3d. per lb., but the demand for this is slow. Yellow prussiate of potash meets with a fair inquiry at from 6¾d. to 7¼d. per lb., according to quantity. Only a quiet demand for carbonate of potash is about at the moment, and at £25 per ton, or rather less than this, values seem to have an easy tendency. Caustic potash, however, keeps steady and in moderate demand at £33 5s. per ton for prompt delivery of one to five-ton lots.

In spite of the relatively limited buying interest that is being shown in arsenic just now there has been no further weakening in prices, these being at about £17 per ton at the mines for white powdered, Cornish makes. Sulphate of copper continues firm at from £26 10s. to £27 per ton, f.o.b., and a quietly steady demand for this is reported. Nitrate of lead is selling in small quantities, but at £37 to £37 10s. per ton the price position seems to be somewhat stronger. The acetates are well held, lead being quoted at £40 to £41 per ton for white and £39 for brown, with grey acetate of lime at round £16 per ton and brown at £9 10s. to £10.

Acids and Tar Products

Acetic acid has been rather quiet this week with quotations at about £36 10s. per ton for the commercial 80 per cent. and £66 for glacial. Oxalic acid is quiet, but about unchanged at 3¾d. per lb. Buying interest in citric acid is slow, but prices are fairly steady at about 1s. 11¼d. per lb. Tartaric acid is moving off in limited quantities at from 1s. 4d. to 1s. 4¼d. per lb.

Sales of pitch continue on an unsatisfactory scale, but values are about unchanged at £2 17s. 6d. per ton, f.o.b. There is a moderate inquiry about for carbolic acid, and prices are well held at up to 2s. 5d. per gallon for crude material, and about 6¾d. per lb. for crystals. Creosote oil is rather slow, and at 6¾d. per gallon the tendency is easy. Solvent naphtha is in fair demand, and prices keep steady at about 1s. 2d. per gallon.

Lead Tetræthyl Inquiry

Evidence by Professors Pope and Baker

The committee which is inquiring whether the use of lead tetræthyl in petrol is injurious to health resumed its sittings at the Office of Works on Wednesday.

Sir William Pope, professor of chemistry at Cambridge, gave evidence, and was questioned as to the experiments carried out on animals. He said that such experiments were not comparable with similar experiments on human beings. Lead tetræthyl acted so violently on the central nervous system that no deduction could be drawn from the effects produced on low animals. He added that to obtain positive evidence as to whether the use of lead tetræthyl was injurious to health it would be necessary in his opinion to experiment on garage hands. He thought, however, that nobody would dare to make such an investigation. In answer to questions, he said that the committee would find it very difficult in any reasonable time to answer the question put to them. Stringent regulations should be drawn up governing the use of lead tetræthyl and something in the nature of a leaflet should be issued calling attention to the danger of its use. He also suggested that every garage where tetræthyl was used should be placed under the supervision of the Ministry of Health, and every employee medically examined.

Professor H. B. Baker, director of the chemical laboratories at the Royal College of Science, also expressed the view that there was danger in the use of lead tetræthyl in petrol. Nobody could go down Piccadilly without smelling lead tetræthyl.

The Chairman.—Is there any danger of people being poisoned by it in Piccadilly?

Professor Baker replied that such a question was difficult to decide, adding, "I have not yet suffered by walking down Piccadilly."

Mr. G. I. Finch, lecturer in the chemical department of the Imperial College of Science and Technology, South Kensington, said that in his opinion the use of lead tetræthyl in petrol would effect a saving of £15,000,000 in the national petrol bill. Leaded petrol could be safely used if proper regulations were made by organised bodies. He had made experiments with motor exhaust gases from cars burning lead tetræthyl petrol, and had come to the conclusion that there was a real danger to the community from the lead dust contained in these gases, especially in a congested area like London. The Chairman pointed out that experiments had been made over the last five years in America, and no case of illness which could be attributed to the use of leaded petrol had been traced. Mr. Finch replied that it would probably be 10 to 15 years before the effect of the poison would be seen. The committee adjourned until Monday, June 11.

Monel Metal: Important Developments

The following announcement is made by G. and J. Weir, Ltd., of Cathcart, Glasgow:—

The progressive development of the use of Monel metal in recent years, throughout Great Britain and Europe, has led both the International Nickel Co. and us to consider, in respect of the future, closer relationship so far as our Monel metal department is concerned. It has, as a result, been mutually agreed to form a new British company, to take control of the work hitherto done by Weir's Monel metal department, which new company has operated as from the June 1, 1928. The name of the new firm is Monel-Weir, Ltd. Its registered address is: "Cathcart, Glasgow." The directors are: The Lord Weir, P.C. (chairman); J. R. Richmond, C.B.E.; J. G. Weir, C.B.; C. R. Lang, C.B.E.; R. C. Stanley (U.S.A.); W. B. Lawson (U.S.A.); and M. B. Dickie (managing director). This new company will assume all the liabilities of Weir's Monel metal department, in respect of its creditors; it also will collect all the outstanding accounts due to the department by its customers—so that, with continuity assured, the minimum of book-keeping trouble should be caused to creditors and debtors alike. The formation of this new company marks a desire to extend, in every advantageous way possible, the development and consumption of Monel metal.

All correspondence and cheques for accounts up to May 31 should be made out in the name of Monel-Weir, Ltd., and should be sent to that company's address: Cathcart, Glasgow.

Company News

HORACE CORY AND CO.—An interim dividend of 8 per cent. per annum, less income-tax, is announced on the ordinary shares for the half-year, payable on July 2.

ESPERANZA COPPER AND SULPHUR CO.—The net profits for the year 1927 were £15,104 and £9,814 was brought forward. A dividend of 6 per cent. is proposed, carrying forward £9,918.

ENGLISH BEET SUGAR CO.—The net profits for the twelve months ended March 31, were £100,000 after adding £69,925 to the reserve fund, and a dividend of 20 per cent., tax free, is proposed on the ordinary shares.

A. BOAKE, ROBERTS AND CO.—A final dividend of 1½ per cent. on the ordinary shares, has been declared, making 6½ per cent., free of tax, for the past year, and the sum of £5,000 is added to reserve, leaving £18,865 to be carried forward

J. C. AND J. FIELD.—A profit of £12,150 is reported for the year ended March 31, 1928, to which is added £7,032 brought forward, making £19,182. The board recommends a dividend of 10 per cent. on the ordinary shares, less income tax, carrying forward £7,099.

KING'S LYNN BEET SUGAR FACTORY, LTD.—After providing for all charges, for preliminary expenses, etc., and after transferring £713 to general reserve, the first annual report for the period ended March 31, 1928, shows that there is a balance of net profit of £45,000. The directors propose to apply this sum to the payment of a dividend upon the ordinary shares of 10 per cent., free of tax.

BOOTS PURE DRUG CO.—The full report for the year to March 31 last, states that the trading profits, including transfer fees, amounted to £913,973, and net profit was £701,973. Sum of £150,000 is placed to reserve fund, raising that fund to £700,000. Ordinary dividend is maintained at 24 per cent., and, in addition, there is a bonus of 3¾ per cent., leaving a carry forward of £208,307.

CONSETT IRON CO., LTD.—The company reports a profit for the past year of £300,322. Of this amount, interest on debenture stock absorbs £150,000, leaving £150,322. There was, however, a debit of profit and loss account at April 1, 1927, of £464,251. After deducting from this the available profit for the past year and adding £4,852 to write off special expenditure, there remains a balance at debit of profit and loss account of £318,781. This sum has been written off by a transfer from reserves, which now stand at £871,151.

"SANITAS" CO.—The balance at credit of profit and loss account for the year ended March 31, 1928, including £1,835 brought forward, amounts to £62,782. From this sum £7,326 has been paid as dividend on the 9 per cent. cumulative preference shares for the half-year ended September 30, 1927, and £16,000 as interim dividend on the ordinary shares, leaving, after payment of the final dividend of 4½ per cent. on the preference shares and a final dividend of £29,000 on the ordinary shares, a balance of £3,130, which sum it is proposed to carry forward.

TARSLAG (1923).—The profit from trading accounts of Tarslag (1923), tar slag manufacturers and road construction contractors, for the year ended December 31, 1927 (including £2,131 profit realised on sale of part of the company's property), is £16,234, to which must be added the balance brought forward of £9,139, making £25,373. Depreciations have been written off plant, rolling stock, and leases amounting to £9,332, directors' fees require £710, a reserve has been made for income tax for past year of £2,952, and dividends have been paid on the 8 per cent. cumulative preference shares for the twelve months ended June 30, 1927, absorbing £12,000, leaving a credit balance of £377, which directors recommend should be carried forward.

CAPE ASBESTOS.—For the year ended December 31, 1927, the report states that the accounts show a profit, after provision for taxation and bad and doubtful debts, and including income from Capamianto, S.A.I., Turin, of £39,704, and the balance brought forward was £11,758, making £51,462. To reserve fund (thereby increasing amount of reserve to £105,000) has been placed £15,000, and to staff benefit fund £3,000. The directors recommended a dividend of 12½ per cent. per annum (less income tax) on the ordinary shares, and a dividend to the preference shareholders of an amount equivalent to dividend (less income tax) on the ordinary shares, carrying forward £11,862. The profits are stated to show a considerable advance, due to continued appreciation in world's markets of company's raw material, as well as its manufactured products.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to June 23, 1928.

EPHEDROL.

488,491. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Ltd., 31–34, Basinghall Street, London, E.C.2; merchants and manufacturers. February 14, 1928. (To be Associated. Sect. 24.)

481,145. Class 1. Nitric acid and chemical products manufactured from nitric acid, nitrous acid or other nitrogen compounds, all being chemical substances. Norsk Hydro-Elektrisk Kvaelstofaktieselskab (a joint stock company registered under the laws of Norway), 7, Solligaten, Oslo, Norway; manufacturers. May 31, 1927. (To be Associated. Sect. 24.)

481,146. Class 2. Nitrate of lime, nitrate of ammonia, cyanamide of lime, and similar products containing nitrogen compounds, all being chemical substances used for agricultural and horticultural purposes. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. etc., as above.

488,050. Class 1. Chemical substances used in manufactures, and anti-corrosives. Bakelite, Ltd., 68, Victoria Street, London, S.W.1; manufacturers. January 28, 1928. (To be Associated. Sect. 24.)

Registration of this Trade Mark shall give no right to the exclusive use of the letter "B."

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

ZINC CHLORIDE.—The Ministry of Railways, Sofia, is calling for tenders for the supply of zinc chloride for the treatment of railway sleepers. Tenders are to be presented in Sofia by June 19. (Reference B.X. 4,482.)

I.C.I. in Australia

A REPORT from Melbourne states that Imperial Chemical Industries (Australasia) has been registered there. The company has a nominal capital of £2,500,000 in £ shares. The directors include Sir Lennon Raws, in control of I.C.I. business in Australia, and Sir H. Y. Braddon. The object of the company is to acquire interests in the Australian branches of Brunner, Mond and Co. and Nobel Industries.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BIO-CHEMICAL REMEDIES, LTD., London, S.W. (M., 9/6/28.) Registered May 22, £350 debenture to E. Johnston-Noad, 8, Bloomsbury Square, W.C.; general charge *Nil. December 15, 1927.

GRASSHOPPER, LTD., London, N., manufacturers of medicinal preparations. (M., 9/6/28.) Registered May 22, £500 debentures part of £5,000; general charge. *£3,000. May 24, 1927.

Satisfaction

BIO-CHEMICAL REMEDIES, LTD., London, S.W. (M.S., 9/6/28.) Satisfaction registered May 22, £2,050 registered February 15, 1928.

Receivership

ALLAN CLEAVER AND CO., LTD. (R., 9/6/28.) R. W. Meacock, C.A., of 123, Cannon Street, E.C. was appointed Receiver and Manager on May 24, 1928, under powers contained in debentures dated May 19, 1926.

London Gazette, &c.

Bankruptcy Information

SMITH, Wilfred, 5, Byron Road, Ealing Common, Middlesex, and 37, Great Tower Street, London, E.C., chemical merchant and agent. (R.O., 9/6/28.) Receiving order, May 24. Creditor's petition.

Company Winding Up Voluntarily

NOXN, LTD. (C.W.U.V., 9/6/28.) By special resolution, May 9, confirmed May 25. C. H. McKnight, Chartered Accountant, 122, London Wall, E.C.2, appointed as liquidator.

Partnership Dissolved

PEMBROKE CHEMICAL CO. (Harry STRAW and William Eric Cyril Fairley RICE), manufacturing chemists, 30, Wilde Street, Liverpool, by mutual consent as from May 23, 1928. Debts received and paid by H. Straw.

New Companies Registered

BRIQUETTING AND CARBONISING SYNDICATE, LTD., 27, Soho Square, London, W.1. Registered June 1. Nom. capital, £100 in £1 shares. To carry on the business indicated by the title. Directors:—A. T. Hurter, O. J. Parker, A. E. Samuels.

BRITISH CONTROLLED METAL AND CHEMICAL CORPORATION, LTD.—Registered May 31. Nom. capital, £100 in £1 shares. To acquire any invention relating to metals or chemicals and to carry on the business of a mining, smelting and refining company. A subscriber:—E. F. Roughton, 1, Martin Lane, London, E.C.4.

BRITISH PACIFIC INDUSTRIES, LTD. Registered as a "private" company on June 2. Nom. capital, £40,000 in 160,000 8 per cent. cumulative preference shares of 4s. each and 160,000 ordinary shares of 1s. each. To adopt an agreement with G. A. W. Hepburn, and to carry on the business of producers, treaters and sellers of coal, shale, lignite and other carbonaceous substances and fuels, manufacturers of coke, chemicals and oils, etc. Directors:—B. A. Holland, G. Harland, E. Harrison, E. Smith, R. Hutton and Sir A. Welby, K.B.E. Qualification 250 shares. Remuneration, £1,000 per annum and 10 per cent. of the profits available for distribution in any year when such profits suffice for 10 per cent. to be paid on the ordinary shares, divided between them. The chairman is to receive £50 per annum extra.

BUSSEY COAL DISTILLATION CO., LTD.—Registered as a "public" company on June 5. Nom. capital, £280,000 in 200,000 cumulative participating preference shares of £1 each and 800,000 ordinary shares of 2s. each. The objects are to acquire from the Bussey Low Temperature Process, Ltd., the license or right to operate throughout Great Britain, Northern Ireland and the Irish Free State a process for treating coal or other carbonaceous material for the extraction and recovery therefrom of the oil, gas and other volatile hydrocarbon constituents, and to carry on the business of manufacturers, etc., of coal, shale, any other carbonaceous, mineral, chemical and other substances and fuels of any kind; manufacturers of and dealers in coal, coke, patent and smokeless fuels, oils, spirits, chemical manures, fertilisers, dyes, tar, ammonia, chemicals, etc. Directors: A. Powell, 19, Berkeley Square, London, W.1; J. Dunnachie, Glenboig House, Glenboig, Lanarkshire; J. D. Stobart, Lieut.-Col. W. H. Benett-Dampier, E. Adamson, and E. Harrison.

NEW G. AND S. PROCESSES SYNDICATE, LTD., Imrie House, King William Street, London, E.C.4. Registered as a "private" company on June 5. Nom. capital, £20,000 in 1s. shares. To manufacture and deal in all materials used or capable of being used in the manufacture of (*a*) splinterless, safety, non-breakable, reinforced or protected, and every other kind of glass, and (*b*) cellulose acetate and artificial silk pulp and all fibrous substances, etc., and deal in all kinds of chemicals and drugs, paints, colours, varnishes, enamels, waterproofing materials, etc.

Faraday Society Discussion on Catalysis

THE Faraday Society is organising a general discussion on "Homogeneous Catalysis," which will be held in the Physical Chemistry Laboratory of the University of Cambridge, on Friday and Saturday, September 28 and 29, 1928. Professor C. H. Desch, F.R.S., will act as chairman. The subject for discussion will comprise the catalysis of homogeneous reactions, such as isomeric change, hydrolysis and esterification, association and dissociation, thermal decomposition, slow oxidation, etc., under the following principal headings: Uncatalysed Homogeneous Reactions and Negative Catalysis; Intermediate Addition-Compounds in Homogeneous Catalysis; Neutral Salt and Activity Effects in Homogeneous Catalysis; and Ionisation as a factor in Homogeneous Catalysis. Heterogeneous catalysis, the radiation hypothesis, photo-chemistry and gaseous explosions, which have formed the subject of previous General Discussions, will be excluded from the programme. A number of important foreign guests have been invited by the Society to take part in this discussion. Members and visitors will, by the kindness of the College authorities, be accommodated at Pembroke College during the period of the visit. Further particulars will be communicated shortly.

Benn Brothers' Other Journals

THE CABINET MAKER.—The Inside of a Mattress—XLIII; Instructions for Cabinet Makers; Exhibitions of Students' Work.

DISCOVERY.—"Industrial Uses of Ultra Violet Light," by L. V. Dodds; "The Great California Dam Disaster," by H. S. Walter, A.M.Inst., C.E.; "Unsolved Problems of the Moon," by J. A. Lloyd.

THE FRUIT GROWER.—National Food Production Number: "A Better Production Campaign"; "Manuring in Relation to Fruit Quality," by T. Wallace; "Influences in Tomato Production," by W. P. Bewley.

GARDENING ILLUSTRATED.—"Notes from an Essex Garden," by Viscountess Byng of Vimy; Raising Daffodils from Seed; The Mock Oranges.

THE GAS WORLD.—First Institution Number: History and Description of Cardiff Gasworks; Institution of Civil Engineers; Centenary Celebrations.

THE ELECTRICIAN.—Col. Crompton's Reminiscences; Bath and the Incorporated Municipal Electrical Association; A New Electrical Glove Testing Method; The Electrical Refrigerator Campaign.

HARDWARE TRADE JOURNAL.—Opening of New London Iron and Steel Exchange; More About Old Pewter; New Draft Order under the Merchandise Marks Act.

THE TIMBER TRADES JOURNAL.—Esthonia and Cutting Leases in Russia; British Columbia's Record Shipment of Sleepers to the U.K.; Sawmill Interests and "Safeguarding"; Timber Season Opens at London Docks; Sawmill; On Knifing Four-cutters.